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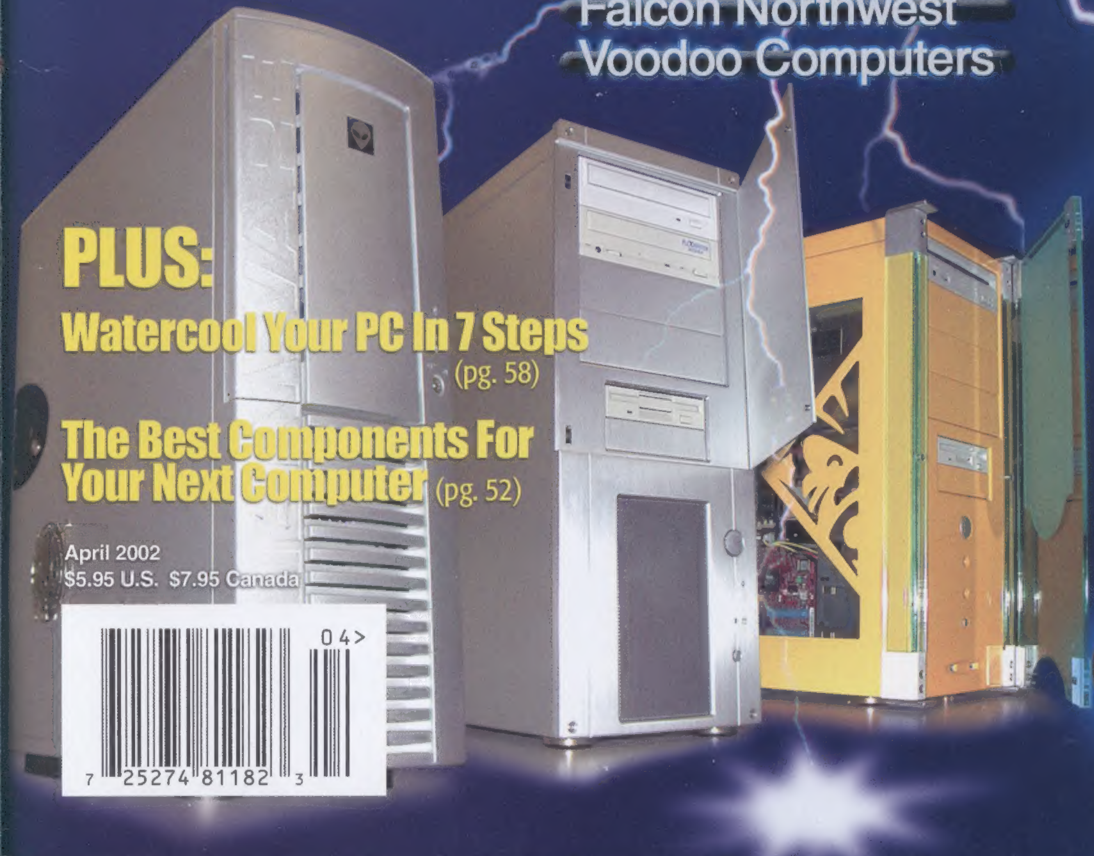

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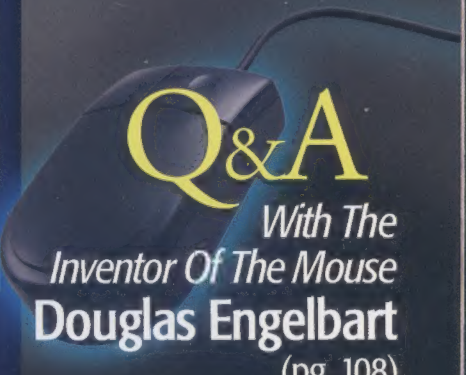

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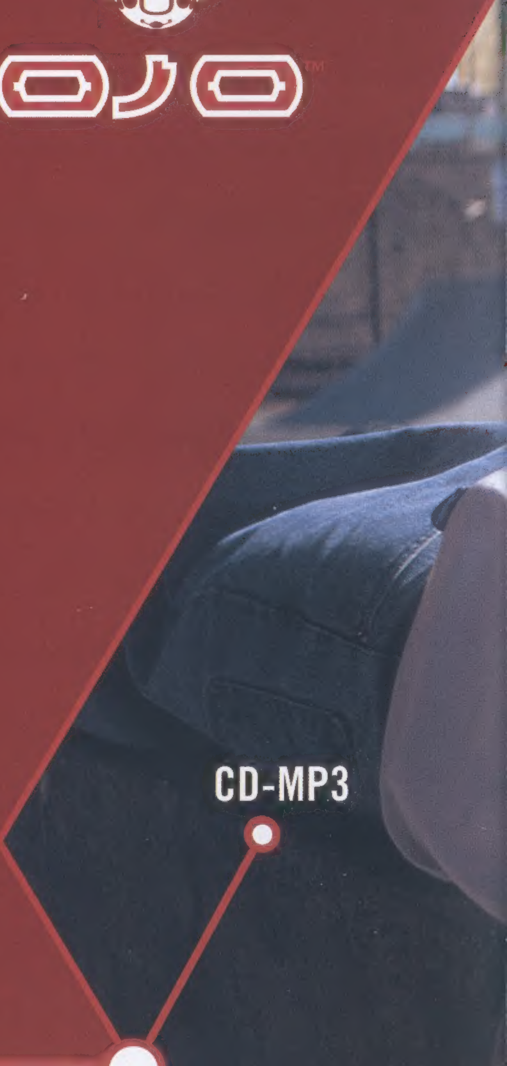

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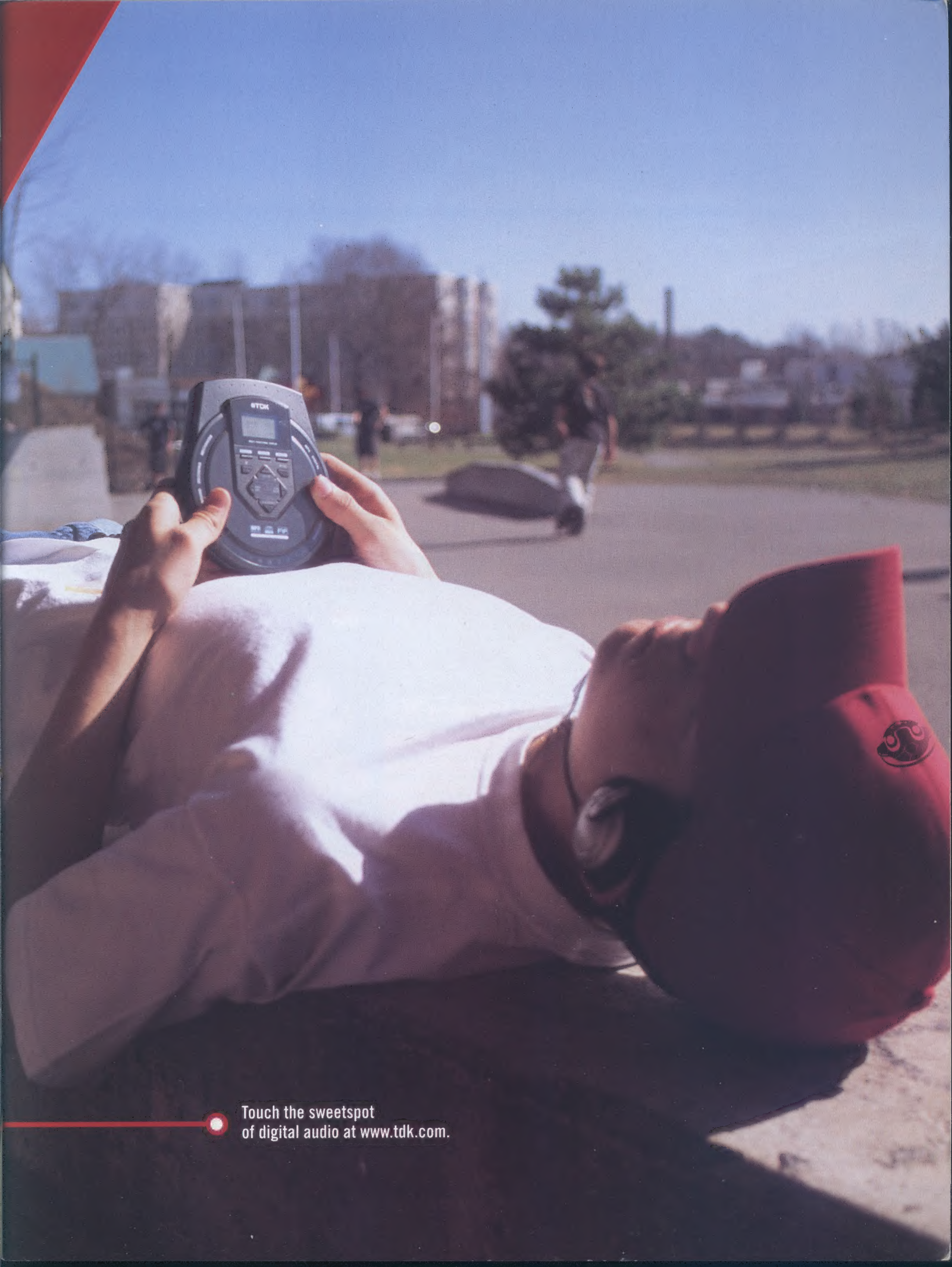
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GREETINGS FROM SAMITLAND

Knock, knock. Who's there? The fifth issue of *CPU*. (Ouch! Kindly desist from clubbing me about the head with your old MFM drives.) For those of you not rolling on the floor laughing with tears in your eyes, I should quickly admit that we at *CPU* are much better at technology than comedy. (But you've probably already surmised that.) I still say that sometimes it doesn't hurt to try for that elusive laugh. And with that in mind, let's not forget that this is the April (Fools') Issue: Special Edition. Why the "SE" moniker? Well, it's our first-ever April issue, so maybe it will become an ultra-collectible edition, selling on eBay for thousands of dollars, if only because we erred by neglecting to mention this was the "SE" issue on the cover. Just maybe. And just maybe S3's ViRGE will rise from the grave to displace NVIDIA's NV25. At any rate, as you rove around the mag, keep an eye open for our jester graphic. When you see it, watch out for our little April Fools' pranks. We had a good time putting these together for you, so I hope you have fun with them, too.

Did you notice the new "Coder's Corner: XML" piece last month? We've been toying with adding another monthly programming article, but I'd like to hear what you have to say about the XML piece first. Any preference about what we should cover? I was considering VB or C++, but I'm open to opinions. After all, we're trying to meet your needs. So tell us what you want by dropping me an e-mail at editor@cpumag.com with a subject line that reads "Coder's Corner Suggestion," prefacing your language of choice. That'll help us tally up your requests before we make a final decision.

It's time I got going, but one last thing: Check out the custom systems that were built for us on page 46 ("Three Of A Kind: Systems That Take No Prisoners"). I'd like to thank Falcon Northwest, Alienware, and Voodoo Computers for taking the time to throw together these ultra-cool PCs. The quality and attention to detail these companies place on their products is hard to find in the mainstream these days. And it's good to know that there are still companies out there that share the same passion as we all do.

I'm off to India again, but I'll spare you any further diatribe on the matter because this time I'm on vacation. I'll catch you here next month . . . same place, same time. Keep the comments coming. We love hearing from you.

Samit G. Choudhuri, Publication Editor, *CPU*

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What's Happening

Compiled by Cal Clinchard

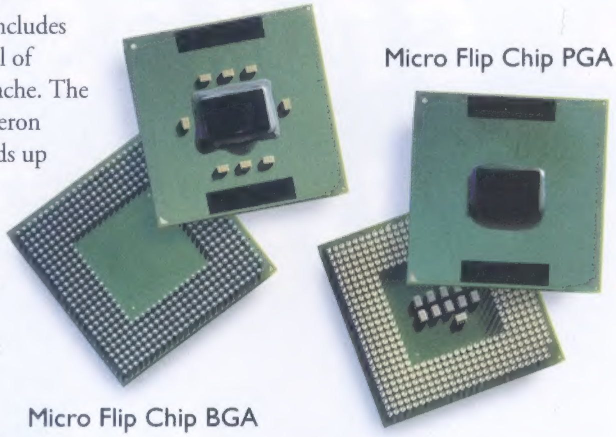
In the spirit of April Fools' Day, we've tossed in three stories that just aren't true. See if you can spot the ones we made up.

In Hardware . . .

Intel Gets Cool

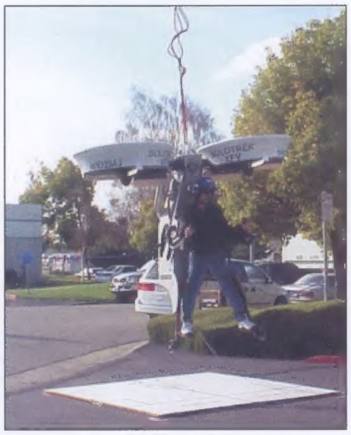
Last month we reported that VIA's new C3, a cool-running x86 processor built on a 0.13-micron core, was in production. Now Intel has announced seven new M family mobile processors that are also low power-consumers built on a 0.13-micron core. Processors include two Low Voltage Mobile Pentium III Processor-M versions and an Ultra Low Voltage Mobile Pentium III Processor-M; all three feature a 512KB L2 cache and on average, consume less than one watt of power each. Clock speeds are 850MHz and 866MHz for the vanilla Low Voltage chips (each costs $316) and 750MHz for the Ultra Low version ($209).

The new chip list also includes four Celeron processors, all of which have a 256KB L2 cache. The three standard Mobile Celeron processors have clock speeds up to 1.06GHz, 1.13GHz, and 1.2GHz; cost $107, $134, and $170, respectively; and operate at 1.45 volts. The fourth, the Ultra Low Voltage Mobile Celeron processor, has clock speeds up to 650MHz, costs $144, and operates on 1.1 volts. The list of OEMs building systems around the new processors isn't surprising; it includes Compaq, Dell, Hewlett-Packard, IBM, NEC, and Toshiba. ▲



Meet The Jetsons

Well, sort of. Flying cars still occupy the science fiction realm a la "Blade Runner," but personal flying machines aren't too far off. Millennium Jet (www.solotrek.com), based in Sunnyvale, Calif., recently announced the success of its SoloTrek XFV. The SoloTrek uses ducted fans instead of propellers; one test flight proved the strap-on, fan-like device could, in its current incarnation, lift a man and keep him airborne for as long as 19 seconds. Granted, the man was tethered 3 feet above the ground, but still.



The SoloTrek uses a two-cycle piston engine and is designed to produce minimal vibration and noise. The first for-sale SoloTrek will travel at speeds as fast as 80mph and will have a range of approximately 130 miles. Its maximum altitude isn't certain, but the device is intended to hover at or below 100 feet above ground. According to Millennium Jet, the device should hit the market sometime in 2002 and will bear a price tag "similar to that of a very high-end sports car." ▲

Vivastar Gets Competitive

Vivastar, an up-and-coming Swiss DVD drive manufacturer, recently announced a partnership with RealNetworks that threatens to impinge on the seemingly omnipotent new Moxi MC's (Media Center) digital entertainment turf. The partnership involves the impending release of Vivastar's DVD EveryWare, a digital device that, like the Moxi MC, provides Internet access via cable modem or DSL, plays CDs and DVDs, and can store hours of audio and video.

Although the DVD EveryWare doesn't match the Moxi MC's maximum storage capabilities, it has a unique standout attribute: Using DVD EveryWare software loaded on a supported notebook or handheld device, users can reportedly watch streaming video (and of course listen to audio) originating from the DVD EveryWare box back home from virtually anywhere. Vivastar spokesperson Josef Hans says the DVD EveryWare is on track for a June 24 release in Europe; a U.S. release should follow shortly thereafter. ▲

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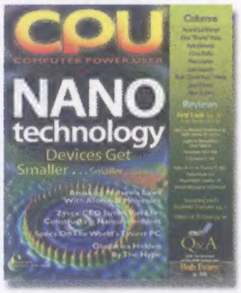

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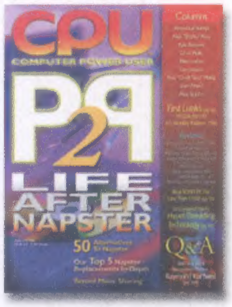

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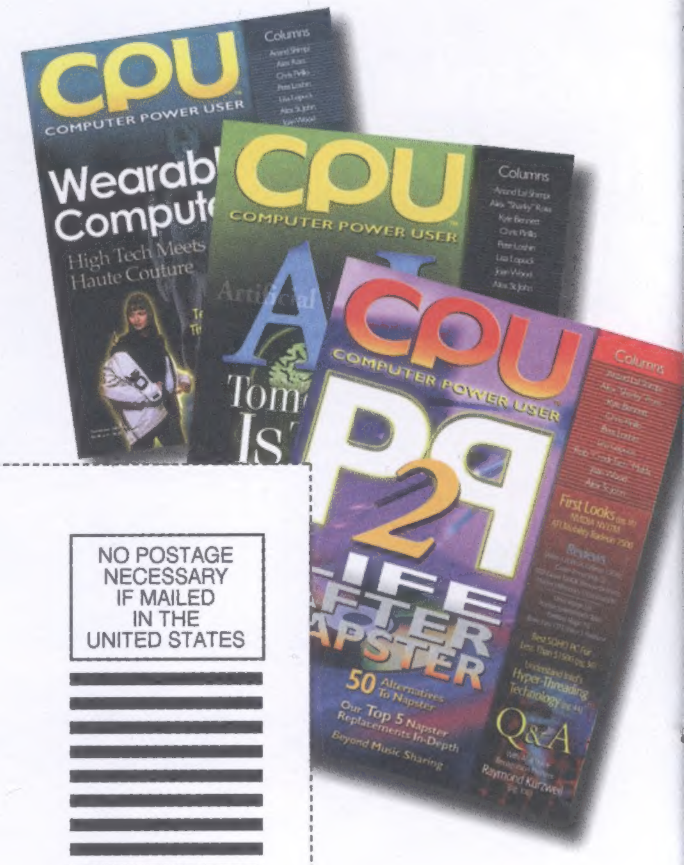

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Slice & Dice: The Next Wave Of Entertainment Devices

Not too long ago Hewlett-Packard debuted its pricey ($999) de100c Digital Entertainment Center, a Linux-based multifunction device that lets you store 685 hours worth of music on a 40GB hard drive. We could smell a trend coming. What makes the de100c so fantastic compared to typical jukeboxes is that it provides Internet connectivity: You can listen to Internet radio, buy music off the Internet, and even burn CDs with encoding rates as fast as 256Kbps.

Like the de100c, Moxi Digital's new Moxi MC (Media Center) capitalizes on two growing trends: that of essentially stuffing a PC dedicated to entertainment in one or two set-top boxes and that of DVD's increasing popularity. According to the Consumer Electronics Association, U.S. sales of DVD players grew 49.5% in 2001 and are expected to grow 25% more in 2002.

The $425 Moxi MC, however, ups the ante immensely with features that include every facet of digital entertainment: It's a digital cable and satellite receiver; a CD/DVD player; a digital jukebox capable of storing about 500 CDs worth of music (and if that's not enough, you can add storage via a FireWire port); a 60-hour video recorder (a la TiVo); and an Internet gateway via cable/DSL modem. The device also lets you play video on as many as four televisions anywhere (within reason) in your house using a $75 auxiliary receiver. We're over-stimulated just thinking about it. ▲

Hewlett-Packard's de100c Digital Entertainment Center

Moxi Digital's coveted Moxi MC

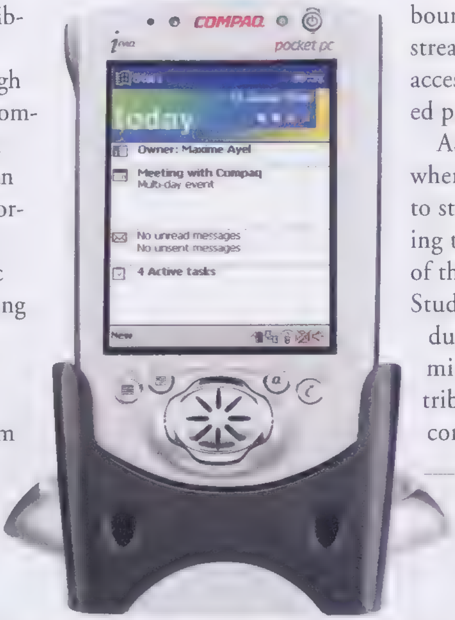
We could smell a trend coming

ASU Equips Students With PDAs

Arizona State University recently distributed Compaq iPAQ pocket PCs to first-year graduate students in its MBA High Technology Program. Each iPAQ comes complete with Microsoft's Pocket software and includes syllabi for first-year coursework, an academic calendar, and faculty contact information. By giving PDAs to students, ASU intends to promote organization, academic interconnectedness, and a sense of well-being that only PDA ownership provides.

The High Technology Program integrates business and management classes with engineering and science, and program officials oversee a one-schedule-fits-all course load. Productivity might improve, with Pocket versions of Word, Excel, and PowerPoint always at each student's fingertips. But there's bound to be a party or two where the iPAQ's streaming video, audio, and wireless Internet access features aren't exactly used for intended purposes.

ASU first tried the PDA program last fall, when 55 Compaq iPAQ 3670s were provided to students and faculty free of charge, according to Professor Brian Boyd, faculty director of the MBA High Technology program. Students have since reported increased productivity and having approximately 45 minutes of extra time each week. PDA distribution to first-year students is slated to continue indefinitely. ▲



First-year students in ASU's MBA High Technology Program receive Compaq's iPAQ 3670 to help stay connected.

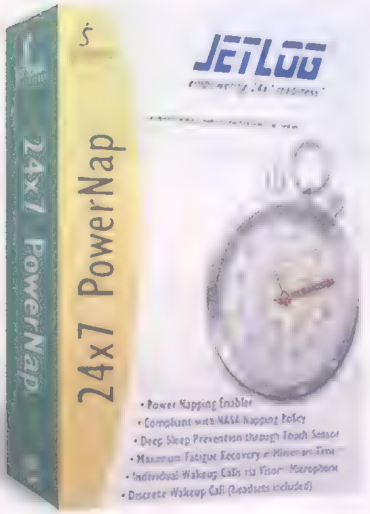
In Software . . .

New Software Enables Power Napping, No Blankie Required

Sleepy Handspring Visor users can now purchase JETLOG's (www.jetlog24x7.com) new 24x7 PowerNapping Springboard module for $99. Based on NASA's sleep-pattern research for pilots and astronauts, JETLOG touts the module as a remedy for sleep-deprived business people and others (it seems to us that truckers would be excellent candidates, as well) who stand to benefit from a refreshing power nap.

The module includes a touch-sensitive device and software that work together to detect when a user falls into deep sleep or an REM state based on muscle tension. When tension occurs, the software initiates what JETLOG calls "extra loud internal speaker sounds" to prevent sleep inertia, or "the grogginess, disorientation, sleepiness, headaches, and bad mood that accompany waking out of" deep sleep. The module includes a headset so users can drown out external noise and focus the apparently intense beeps directly at their ears.

The PowerNapping module works on Visor, Visor Deluxe, Visor Edge, Visor Neo, Visor Platnium, and Visor Pro handheld devices. The module includes a port for an external sensor (so you can actually attach the thing to yourself rather than clutch it in your hand), but due to testing obstacles with the electrode component, the external sensor is not yet available. However, according to JETLOG President and CEO Karim Daghbouche, a standalone module with a wider range of features will be available in Q2 of 2002. ▲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• Discrete Wakeup Call (headsets included)

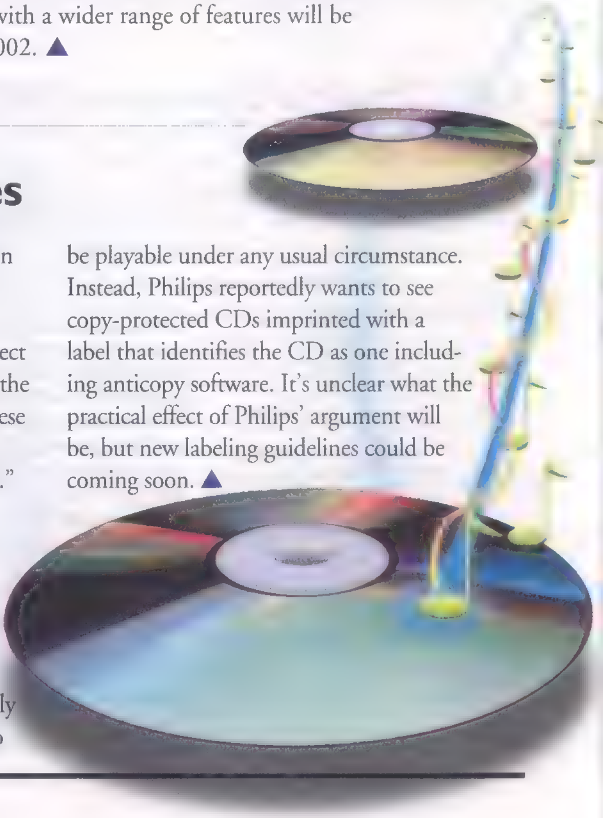
So you've always wanted to be an astronaut? At least you can sleep like one with JETLOG's 24x7 PowerNapping Springboard module.

CD Anticopy Efforts Face New Hurdles

Citing the rules set forth in the 1992 AHRA (Audio Home Recording Act), Democratic Rep. Rick Boucher of Virginia recently wrote a letter to the RIAA (Recording Industry Association of America) in which he raised concerns about industry trends. Rep. Boucher questioned the legality of including anticopy mechanisms on CDs because the AHRA provides that a music consumer should be able to make personal copies; it appears, then, that anticopy CDs violate consumers' fair-use rights.

"It is worth noting, however, that the AHRA is aimed primarily at dedicated audio recording devices like DAT machines, audio CD burners, minidisc, and technologies like that," says Fred von Lohmann, a staff attorney for the Electronic Frontier Foundation (www.eff.org). "It does not have any direct relevance to PC-based technologies like the CD burners that most PCs ship with these days. It's a strange accident of copyright law that we treat these things differently."

Taking a different tack, Philips Electronics, one of the early pioneers in the CD industry, recently went so far as to argue that CDs containing anticopy software shouldn't be able to bear the standard Compact Disc logo. Philips argues that such CDs aren't really CDs at all because CDs are supposed to be playable under any usual circumstance. Instead, Philips reportedly wants to see copy-protected CDs imprinted with a label that identifies the CD as one including anticopy software. It's unclear what the practical effect of Philips' argument will be, but new labeling guidelines could be coming soon. ▲



Computers With Taste

Montreal-based Labroque Solutions recently announced a team-up with VIA Technologies to develop processors and software dedicated to the sense of taste. The result is a module, currently in its third phase of testing, that uses a proprietary algorithm and a number of different sensors to effectively determine the contents of various substances. The process is "similar to processes used to detect environmental pollutants, such as toxicity levels and alkalinity in water," says Brett Labroque, president and CEO of Lebroque Solutions.

Rather than studying liquids for potentially hazardous contents, however, the Labroque module "reads" liquids and separates different parts in a manner similar to how the human tongue identifies different tastes. Early tests involved analyzing different red wines. Once the module identifies particular elements of taste, the software portion can be made to do whatever programmers want, according to Labroque. "The module has many exciting possibilities" in terms of applications, including the ability to quickly analyze liquids poured into a blender and determine the ratio of each liquid.

Numerous manufacturers have already expressed interest. Realistic applications include drink analyzers that let bartenders know the exact proportions of alcohol and other liquids; a similar (and healthier) application would benefit makers of juice mixtures and health drinks. Labroque says niche industries should be able to purchase the module by Q4 2002. ▲

Software Shorts

Here are a couple interesting nuggets we ran across right before press time.

iPod For Windows?

Apple politely declined our request for information about its development of iPod software for Windows, but that's not surprising given the company's legendary shroud of secrecy regarding future releases. But by the time you read this, Mediafour's XPlay should be readily available. Formerly known as XPod (Apple nudged Mediafour to change the name because, ah, it's just a little too similar to iPod), XPlay lets you rip MP3 files from a PC running Win98SE/2000/Me/XP to an iPod via an IEEE 1394 (FireWire) connection. XPlay has been enjoying a successful preview, but a handful of questions remain about how much the software lets you do with an iPod; check out Mediafour's excellent XPlay FAQ section for details (www.mediafour.com/products/xplay/faq.asp). According to a Mediafour representative, a firmware updater for Windows is ready for release and might be available by the time this issue prints. ▲

Photo courtesy of Apple

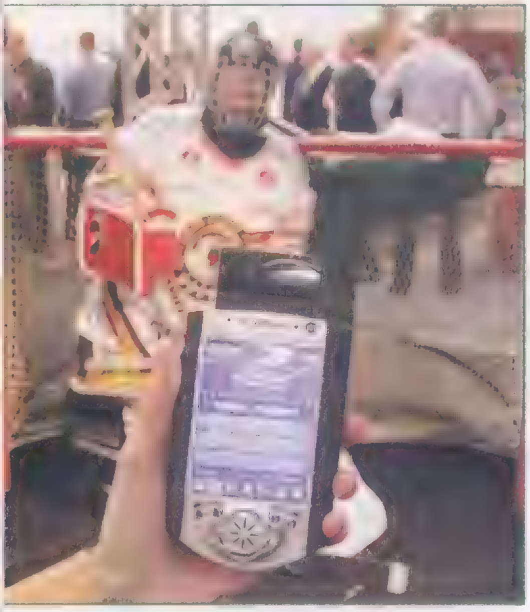
USB 2.0 Driver For XP Now Available

Windows XP users who want to tap into the powerful 480Mbps bandwidth that USB 2.0 provides are in luck. WinXP was released last October without USB 2.0 support, but the final release version of Microsoft's USB 2.0 driver is now available as a Windows Update. The update, called Microsoft USB Driver Version 5.1.2600.0, is available to WinXP users through the WinXP Start menu. USB 2.0 support is also available to OEMs and system builders. Microsoft says it's also on track for providing Bluetooth support for WinXP by mid-2002. ▲

Internet . . .

Be The Ball

Or we could say, "be the puck." It all depends on where Ericsson's new Event System will be used. Here's the deal: The Swedish OEM Ericsson recently tested new software that enables sports fans to experience the sights and sounds of a game via IP multicast. Ercisson's first tests used 12 Compaq iPAQs, with which journalists viewed a hockey game between Lulea and Vastra Frolunda at the Delfinen sports arena in Lulea, Sweden. The test also tapped the city's fiber-optic wireless network so residents at home could watch the game, select different camera angles, and click hyperlinks to statistical information.


Spectators using Ericsson's Event System can access a player's vital stats and view a game from a number of different angles using a supported PDA such as the Compaq shown here .

While watching a game over the Internet is nothing new, the Event System adds a number of features to the mix. The system involves placing Web cams and microphones on players' helmets, sensors on the players themselves, and additional cameras and microphones throughout the arena. As a result, users can simultaneously access multiple views of the same game; sounds directly from game level; and players' heart rates, breathing rates, speed of movement, and position. You can also chat with other users while you experience the event. Ericsson says the Event System's intended uses include almost any arena event, including concerts and trade shows.

The Arena program at the Makitalo Research Center (www.cdt.luth.se/projects/arena), where the Event System is currently under development, is a joint venture between the Lulea University of Technology, Ericsson, and Telia. The system is available for trial installations through Ericsson. Event System supports Linux Red Hat 7.1 and Windows 2000 Server, MPEG-4 streaming video to Windows Media Player, and WLAN-equipped Pocket PCs running Windows CE 3.0. The current Event System version handles as many as 500 simultaneous users and should be more widely available by Q4 2002. ▲

If you guessed that we made up the "Vivista Gets Competitive," "Computers With Taste," and "Watching The Chips Go By" pieces, you guessed right.

Internet Bits

Sometimes all the news simply doesn't fit, but here are a handful of items we squeezed in just for you.

Microsoft Hacked By Al-Qaeda?

According to a report in the New Delhi, India-based Hindustan Times, Mumbai, Bombay, police arrested Mohammad Afroze Abdul Razzak, 25, for connection to terrorist attacks in India, Australia, and the United Kingdom. Among his confessions, Afroze claimed to have infiltrated the Redmond, Wash., castle walls and worked as a Microsoft programmer, where he attempted to corrupt the burgeoning WinXP by planting "Trojans, trapdoors, and bugs" in the OS. A psychiatric examination reportedly proved Afroze mentally competent. The story has been corroborated by numerous media sources, but our attempts to reach the Mumbai Cyber Crime Investigation Cell were unsuccessful. Microsoft is on record as calling the claims "unsubstantiated." ▲

Who Killed Bill Gates?

Self-appointed Bill Gates "curator" Jack Perdue manages a site (www.billgatesisdead.com) dedicated to the life and legacy of Bill Gates and, more to the point, the mystery surrounding his mythical death on Dec. 2, 1999. According to the site, Gates was slain by a sniper in MacArthur Park. The site has generated a lot of controversy, which works out nicely for film director Brian Flemming and the crew behind "The Blair Witch Project," who recently completed a faux documentary, "Nothing So Strange," about Gates' mythic assassination. ▲

Yahoo! Premium Edition

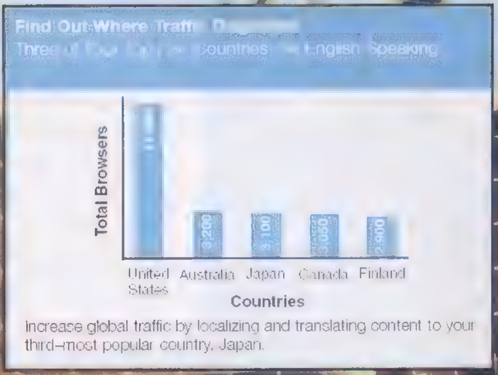
Yahoo! recently linked up with enterprise management powerhouse divine to create Premium Document Search (premium.search.yahoo.com), an online document library for the masses. The site is elegantly stripped down to a single field; type what you're looking for and click Search. The site provides access to more than 70 million full-text documents from more than 7,100 sources and displays a document summary for every hit. If you want to go further, you must pay $1 to $4 to access each article or pay $4.95 a month. But click Qualifying Document before subscribing; tons of sources are listed, but the subscription price might not cover the ones you're interested in. After a search, you can click the Web Sites or Web Pages links for relevant links; you're then back in more familiar Yahoo! territory, although Google (rather than Yahoo!) powers the search engine for these portions of the site. ▲

They Know Where You Live

Quova has received much praise for its GeoPoint service, which provides Webmasters with information about the precise location of Web site visitors. Quova recently teamed with New York-based Jupiter Media Metrix, a highly esteemed e-commerce Web site analysis company, to integrate GeoPoint into JMM's Site Measurement service.

By itself, GeoPoint uses Quova's own geographic mapping technology to determine a site visitor's origin without using cookies, profiles, or click-stream data. A Webmaster "could then tailor the Web content to meet the needs of specific geographies" such as language, currency, and climate, says Cindy Prince Baum, director of marketing for Quova. "A retail site that receives lots of visitors from Chicago, for example, might compel management to run promotions or open a retail outlet in that area to capitalize on the interest there."

Visitors to sites that use JMM's Site Measurement service would see benefits, as well, says Baum. "Consumers will see the end-results of this partnership: Web sites that use Site Measurement are more effective and easier to use, since they display geographically relevant information—products and services that are available within the consumer's market, local events, relevant promotions," and more. Site Measurement integrated with GeoPoint is now available through JMM. ▲



Jupiter Media Metrix's Site Measurement traffic analysis service is now integrated with Quova's GeoPoint system for identifying site visitors' origins.

New On The Net

Looking for some new surfing destinations? Here's a sampling of the many sites that recently hit the Web.

Gamers' Temple

Gamers' Temple (www.gamerstemple.com) provides a new resource for game reviews, with links to reviews, ratings, and strategy guides. Click The Games, and you'll see an A-to-Z index of all the games the site covers. Gamers' Temple is a well-organized site for a startup; as long as it continues to amass a variety of coverage, it's bound to do well. ▲

Watching The Chips Go By

Chipwatch.com is a dream site for chip fans. This site lets you stay in sync with the latest processor news, with ticker-style road maps that track Intel's and AMD's processor development and release cycles. Chipwatch.com is the brainchild of Steven Werznik, a self-proclaimed geek and former system administrator for an undisclosed computer manufacturer. The site includes information about the evolution of the microchip, as well as the latest news and reviews. Especially intriguing is the site's ambitious undertaking of indexing every chipset ever manufactured. The site is updated daily. ▲

Board Sports Heaven

Don't know what a wakeboard is? Visit www.americanboards.com to find out. This new site, launched by big-name skateboard/snowboard/wakeboard manufacturer ABCI (American Boardsports Company Inc.), has the trappings of a corporate site (links for investor relations and press releases) but also packs in tons of enthusiast-worthy information about board sports and board models. Click Brand for all ABCI offerings from 1987 to the present. ▲

BIOS Upgrades Available Online

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. AOpen has had a busy few weeks and has released 50 BIOS upgrades in the two months preceding press time. Here are a few of them; check out www.smartcomputing.com/cpumag/apr02/bios to see the entire upgrade list. ▲

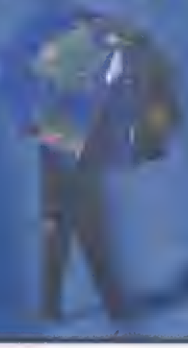
Mfr	File/Date Available	URL
AOpen	FT11R101 ver. R1.01 (01/25/2002)	www.aopen.com/tech/download/mbbios/ft1100.htm
AOpen	37PUR103 ver. R1.03 (01/25/2002)	www.aopen.com/tech/download/mbbios/dx37plusu.htm
AOpen	AX45R103 ver. R1.03 (01/24/2002)	www.aopen.com/tech/download/mbbios/ax45.htm
AOpen	36U103 ver. R1.03 (01/24/2002)	www.aopen.com/tech/download/mbbios/mx36leu.htm
AOpen	AX3S123 ver. R1.23 (01/21/2002)	www.aopen.com/tech/download/mbbios/ax3s.htm
AOpen	3U106 ver. R1.06 (01/21/2002)	www.aopen.com/tech/download/mbbios/ax3su.htm
AOpen	MX3SU104 ver. R1.04 (01/21/2002)	www.aopen.com/tech/download/mbbios/mx3su.htm

Compiled by [illegible]

You Get Paid For That?

Hey, even Silicon Valley gets old fast, especially when every Tom, Dick, and Techie-Geek is fleeing the Web faster than rich folk clamored to the Titanic's lifeboats. If you need a break from the standard-issue cubicle, consider Malaysia. International recruiter e.commerce People (www.ecommerce.com.au) is helping one of its clients find a Deputy General Manager to oversee security, smart card apps, and system integration in Kuala Lumpur. You'll be managing the nine-person Malaysian office, which serves the banking industry.

There are downsides and upsides to this gig. Alas, you will be paid in the local currency, the attractively named ringgit, which has been having considerable problems maintaining its value on the foreign exchanges. You do get to use a company car, but you'd better hope that it has good radials. One travel guide to Malaysia points out cheerily that the rain doesn't come down *all day*. "It usually confines itself to short-lived torrential downpours in the afternoons." ▲



Hot Spots In The Cooling IT Job Market

IT workers may need to put off buying that sports coupe or HDTV another year: Salaries in the tech sector overall will not increase noticeably in 2002, according to the RHI Consulting 2002 Salary Guide (www.rhic.com). High demand and competition among firms over the best talent fueled spikes in compensation for techies throughout the 1990s. In 2001, RHI forecast an 8.4% rise in IT salaries, but this year the employment consulting firm anticipates a meager 0.1% pay increase.

But there are still some hot sectors: Applications architects will see a 6.7% raise overall, and in the wake of cracker and terrorist worries, network security workers should see a 3.4% increase. Specialties that are taking a hit in the recession economy include MIS Managers (-4.0%), Systems Analysts (-2.4%), and Internet Administrators (-2.8%).

Although this is the first time in anyone's memory that IT salary growth over the previous year was flat, Ryan Gilmore, branch manager, RHI Consulting, says it is less of a slump than it is a "return to normalcy" after wildly inflated tech salaries of 2000 and 2001. "It was irrational last year what companies were paying for skilled IT labor," says Gilmore. Even so, some skill sets, such as networking, database management, and Internet/intranet development, will remain hot for years to come.

Hot Jobs In The Tech Sector

Here are a few positions that are expected to see salary increases in 2002.

Job Title	Starting Salary In 2002	Salary Increase
Senior Help Desk	$45,000 to $57,000	4.9%
Database Manager	$83,000 to $114,000	4.8%
Software Engineer	$65,000 to $97,000	4.7%
Disaster Recovery Specialist	$57,000 to $86,000	5.1%
Systems Administrator	$51,000 to $72,500	2.1%
ERP Integration Manager	$76,000 to $105,250	2.9%

Source: RHI Consulting 2002 Salary Guide

Teens Check Their Pulse Online

Source: Kaiser Family Foundation, December 2001 (Survey of 1,209 young people, Sept. 24 through Oct. 31, 2001)

It may come as no surprise that 90% of young people ages 15 to 24 say they have been online, according to a survey commissioned by The Kaiser Family Foundation and conducted by International Communications Research.

What may be surprising is that when asked what they have used the 'Net to do, 75% said they look up health information. In fact, more young people consult health information than download music (72%) or participate in chat rooms or message boards (67%).

Commenting on the report, Dr. Robert Johnson, director of the Division of Adolescent and Young Adult Medicine at the New Jersey Medical School says, "We routinely ask young people who come to us to go to an Internet site and look up additional information about the diagnosis and gain more information than we have the time or the knowledge to give you in that visit."

Esther Drill, co-founder and editor-in-chief, gURL.com, says many of the girls who come to her site find textbooks and sex education too clinical and removed from their lives. Among the most effective pieces the site ever ran was a clickable illustration of the human anatomy because "Girls were excited to find that information in an accessible way," says Drill. ▲

by Alex St. John

The Church Of MPEG-4

Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

I've been making new compression technologies my whole career. I don't generally follow the plodding efforts of Internet standards bodies very closely, but every once in a while brilliant folks somewhere toss a valuable compression technology into a standards body and it gets used for something relevant. We all know what a huge influence MP3 audio was on the Internet. I learned recently that MPEG-4 and JPEG-2000 were close to being "ratified," so I ordered a few books on them from Amazon hoping to learn something interesting about the next generation of state of the art compression technologies. I had only read a few pages when I realized I'd stepped in something smelly. Ninety percent of the first MPEG book was about VRM97. What the hell? Wasn't VRML 97 that 3-D standard for the Internet that came and went five years ago? What was it doing in the MPEG-4 standard?

The deeper I dug the weirder it got. Mixed with the content was propaganda about how the MPEG patent pool would force everyone to comply with their standard and how this standard would revolutionize media delivery on the Internet once the standards members got finished fighting with each other over how the IP will be licensed to everyone else. The most recent news was that they plan to charge 2 cents/hr to anybody wanting to stream MPEG-4 content. This isn't a standards body; it's a technology cartel.

> **3-D technology on and off the Internet has moved so far beyond VRML 97 that reading the spec again after all these years made me feel like an archaeologist uncovering Neolithic cave paintings.**

What was going on here? The book said these guys had been working on this standard since 1994. Since then Microsoft has shipped eight generations of DirectX. Microsoft and Real have shipped several generations of their media players to hundreds of millions of consumers with better compression, streaming and DRM technologies than those specified in MPEG. 3-D technology on and off the Internet has moved so far beyond VRML 97 that reading the spec again after all these years made me feel like an archaeologist uncovering Neolithic cave paintings.

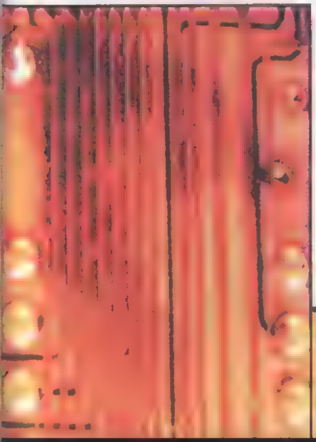
MP4 advocates point to participation in the MPEG-4 consortium by Microsoft, Real and other big companies as an endorsement for the platform. I was at Microsoft from 1992 to 1997 and nobody actually working on shipping media technologies paid any attention to the standards bodies. There were some smart folks in the research division that didn't have to deliver anything who attended these things, but nobody really knew what they did all day anyway.

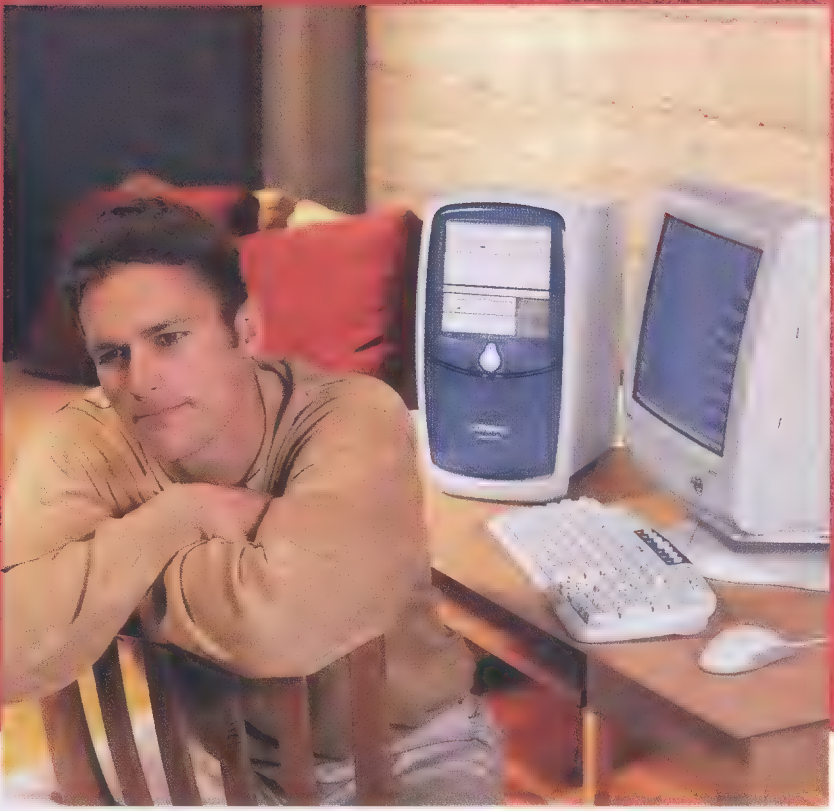
The notion of defining a "Standard" for a business that doesn't exist yet is also a baffling idea. It's one thing to invent a better video compression codec; it's another to fabricate a vast convoluted architecture by committee in anticipation of a business that nobody really understands yet and at worst has already failed. Thomas Edison used to stage public electrocutions of horses to scare the public into believing that AC current was too dangerous to be the standard for the nations' power system, he was an advocate of DC. It's a good thing that the free market has a very effective way of matching technologies with businesses that work.

In researching this column, I of course visited the MPEG-4 Web site where I found a document addressing "Frequently Asserted Falsehoods" about MPEG-4. The "falsehoods" listed are: 1) Standards impede innovation, 2) Standards are obsolete by the time they are done, 3) MPEG-4 does not deliver high quality, 4) MPEG-4 use is onerous because of many patents, 5) MPEG-4 is still not ready/unstable. It's interesting that the consortium feels the need to address these issues so strongly (and unconvincingly). Apparently I'm not the only one that came to identical conclusions upon viewing their work.

On the other hand, the new wavelet compression techniques in JPEG 2000 are really good; images 100x smaller without losing image quality. Now here's a standards body doing something helpful! ■

The Saint. He will be back. Note your thoughts to TheSaint@cpumag.com.





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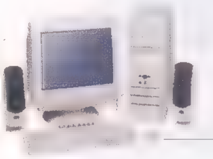

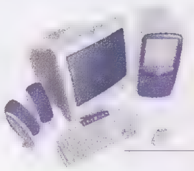

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EXTREME HARDWARE

These Gizmos Don't Sing It, They Bring It

It feels like a screening room this month here in Extreme Hardware HQ. We scream for big screens, little screens, and wirelessly connected touchscreens. They will, they will rock you, so get out of the feeble springtime sun and plop back on your duff where you belong. We can almost hear the Presidential Physical Fitness Award you got in elementary school rusting right now. And, hey, see if you can spot Samit's April Fool's joke as you ogle. *(HINT: It ain't the dog washer.)*

by Marty Sems

Ectaco Universal Translator UT-103

"What's for dinner?" "You done with the PC?" "Move." Most people familiar with each other only really need a few phrases to communicate. In fact, 3,000 phrases can probably get you through an entire relationship. However, you can expand your dating pool to German, Spanish, or French speakers with Ectaco's UT-103 translator ($249.95; www.ectaco.com). Speak your desire into this baby—like the sun-starved Navigator Guild guy did in David Lynch's take on "Dune"—and marvel as the Ectaco speaks the translated phrase. It doesn't have the unlimited vocabulary of Douglas Adams's fictional Babel fish, but on the other hand, you don't have to let the Ectaco swim down your ear canal.

LavakanUSA

Wash your dog in the bathtub and watch man's best friend become a soapy, smelly afghan rug with the bug-eyed look of a panicked horse. Don't lie and say you've never fantasized about just tossing Tiger into the Maytag with some Tide (delicate cycle, of course). A more socially acceptable pet washer is the LavakanUSA (www.lavakanusa.com), which massages your pet clean with jets of water and air. Get this; according to the company's U.S. representative, a Pentium 4 regulates the wash cycle with feedback from temperature and pressure sensors. All you have to do is adjust the cleaning chamber to your pet's size, set the cycle on the Lavakan's touchscreen, clean the drain filter once in a while, and supervise the fun through the safety glass. Safety glass takes on a double meaning if you wash your cat this way, as you will appreciate the protection. At $19,500, the big LavakanUSA is intended for well-heeled grooming businesses, although we can envision the Gates children being cleansed daily in these as part of Bill's Microsoft home concept.

Evolution DataPlay Enabled Motion Picture Player

We've been sitting through a year and a half's worth of trailers, so to speak, for products using quarter-sized 500MB DataPlay disk cartridges—and we're still waiting. But Evolution's DataPlay Enabled Motion Picture Player (www.nowevolution.com; price not yet available), available this September, could be a worthy feature presentation. With a 2.5-inch backlit LCD, headphones, and a lithium-polymer battery, you'll no longer need to lug around a clunky notebook to watch movies on airplanes, you smug thing. The Motion Picture Player plays MPEG-4 and Windows Media movies, as well as music files, such as MP3s, and it can also use MMC and SD storage cards. Traditional tuneheads won't have to wait so long. Evolution and the suddenly hardware-crazed MTV are releasing a DataPlay music player ($369.99) in April.

Fujitsu Plasmavision PDS-6101

It felt like we were just about ready to sell precious bodily fluids to afford a 42-inch plasma HDTV. Oh, wait, we were. That was before CES and Fujitsu's 61-inch Plasmavision PDS-6101 ($24,999; www.plasmavision.com; available in late February/early March). Now, nothing smaller will get our juices flowing. If your wallet is flatter than a plasma screen, Fujitsu's more affordable (in the loosest sense) 50-inch PDS-5002 goes for just fifteen large. Of course, if you're willing to pay for two more inches to have the biggest unit, wait for Samsung's 63-inch HPL6315, coming soon. What's the poor man's workaround? Sit closer to the pathetic television you already have.

NKOK PT Cruiser Computer Mouse

So your suburban neighbors have nicer riding lawn mowers than you do. So their kids are actually competent at soccer. So the neighbors all had PT Cruisers before you. One-up your covenant-bound fellow neighborhood association members by decking out your PC bruiser with a PT Cruiser—the PT Cruiser mouse, that is ($19.99; www.productivity.net/nkok/nkokmouse.htm). This PS/2 beauty evokes all the mild thrills and moderate savoir-faire of its namesake, yet does it all in the palm of your hand. And the cute part, besides its accompanying PT Cruiser mouse pad, is that its two buttons are where the back window should be. This semifly ride's sole flaw is that it's not actual size. Well, that, and you can't see inside the windows.

ViewSonic *air***panel** 150

So what was that wireless, flat-panel, touchscreen monitor Bill Gates used at CES? It was a prototype of ViewSonic's 15-inch *air***panel** 150, which should arrive in the middle of this year (www.viewsonic.com; price not yet available). Unfortunately saddled with lowercase, italic, and bold letters to convey its uniqueness, the LCD is nevertheless way cool. As currently configured, its encrypted 802.11b connection lets you use your PC up to 300 feet away. You can tap-'n'-type on a virtual onscreen keyboard with your stylus or opt for the wireless companion keyboard ViewSonic is building in another hangar. With high-flying products like the *air***panel**, maybe even Bill's dream of a PC-centric household could get off the ground.

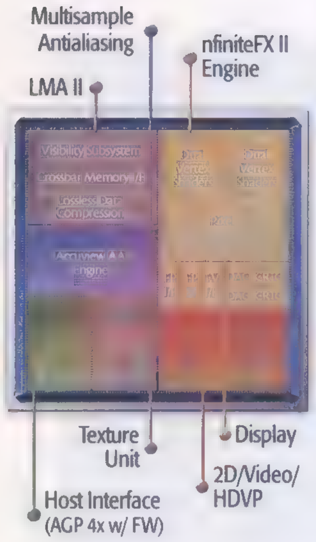
ANSWER: You guessed it—that sharp PT Cruiser mouse is Samit's April Fools' gag. If there is anything "extreme" about it, he'll chew off his own leg. The real joke is that it actually exists (the mouse, not Samit's leg).

First Look

NVIDIA GeForce4 Ti 4600

NVIDIA keeps flexing its vertex-skinned 3-D pixel pecs as CTO David Kirk and his top-notch engineers crank it up again with the release of the NV25 chip. Springtime on the NVIDIA roadmap is usually reserved for a current chip "refresh" for the men in green, but not this time. Although the GeForce4 Titanium (featuring the NV25 GPU) isn't entirely new (it borrows much of the beef from the already well-endowed NV20 and Xbox's nifty NV2A chips), it meshes in some new and rather clever engineering trickery all packed into 63 million transistors. Thus a new line of NVIDIA products is set to tackle the high-end sector. The first to ship (and the focus of this piece) is the flagship GeForce4 Ti 4600.

GeForce4 Ti 4600
$400
NVIDIA
(408) 486-2000
www.nvidia.com



What's New?

NV25 sports a new **nFinite Effects II Engine** moniker, thanks to the addition of a second programmable vertex shader. This will improve efficiency in games (when they eventually arrive) and make use of more complex vertex shading, lighting, and processing algorithms. As a result, the fur/hair rendered in a scene doesn't cramp the NV25's style as much as it would the single vertex shader NV20.

The more significant programmable pixel shader is carried over from NV20 with its four pixel pipelines (nFinite Effects I engine). But this time around, performance is increased with the upping of the NV25's clock to 300MHz with a proprietary heat sink/fan combo to keep the chip from overheating. The Ti 4600's theoretical peak fill rate is an incredible 4.8 billion AA (anti-aliased) samples per second, and geometry processing power is upped to 136 million vertices per second. NV25 supports the DX8.1 versions 1.2 and 1.3 implementation of pixel shaders, bringing it closer to the ATI Radeon 8500's version 1.4 capability.

Sometimes NVIDIA isn't actually introducing a new feature but has only figured out how to demonstrate an existing one impressively. At the GF4 launch party, a rather nifty rock tide pool demo shown with "new" **Z-correct bump mapping**, a feature present on the NV20, caused a stir. The scene looked much more realistic, thanks to correct Z-values for the water, which was no longer intersecting chunkily with the surrounding rocks. Should developers take advantage of the Z-correct bump mapping feature, surface detail (bumps) will look all the better.

Most striking of the improvements over NV20 is NVIDIA's attempt to rugby tackle memory bandwidth limitations with its **LMA II** (**Lightspeed Memory Architecture II**). LMA II implements Quad Cache, which sports four independent speedy access buffers (optimized for primitives, vertex, texture, and pixel) allowing data to be queued and then written into memory, reducing overall memory bandwidth used and providing faster pipeline access.

NVIDIA has vastly improved its visibility subsystem **Z Occlusion Culling** technique since NV20. This technique saves crucial bandwidth by eliminating or "culling" the rendering of hidden pixels that are "occluded" behind other objects in the scene. For example, you are standing outside a bunker containing a gaggle of hidden Nazis. Rather than waste bandwidth on calculating all the geometry and texture into Nazis that you don't actually see, the GPU spends time rendering only the outside portion of the bunker that is visible in the frame. **Occlusion Querying** is another technique game programmers can use to further cull the rendering process. In this instance, you are inside the bunker with the Nazis (though not for long), and the programmer can instruct the GPU to ignore everything outside a bounding box specified by the walls of the bunker.

Another neat trick is the NV25's "**Auto Pre-Charge**," which tells the memory device proactively to "precharge" areas of memory not in use but set to be in the near future. (I'm talking microseconds.) This means that the NV25 doesn't have to wait for the precharge step of conventional GPUs, thus lowering latency for memory accesses and spending less time waiting and more time rendering pixels. LMA II encompasses this new technology with existing techniques from NV20's LMA I, notably the crossbar memory architecture harboring four independent memory controllers acting as a waste management system in terms of more efficient memory bandwidth usage. 4:1 Lossless Z-buffer compression (z-buffer reads and writes for each pixel consume a lot of bandwidth) is also carried over, as is Fast Z Clear, resetting all values in the z-buffer to 0.

Add all this wizardry to a Ti 4600 product with a 128-bit DDR memory bus running at 325MHz connecting 128MB of DDR-SDRAM (2.8ns) packaged

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

in BGA (Ball Grid Array), and a new bandwidth champ is born. The Ti 4600 weighs in with a stonking 10.4GB per second, compared to the older GeForce3 Ti 500 with 8.2GB per second and the previous champ, the ATI Radeon 8500 at 8.8GB per second. The BGA packaging is not only easier to lay out but also much cheaper, allowing 128MB of memory to be economically viable for NVIDIA for the first time. Game developers will benefit by being able to use larger textures or gamers will be able to play at higher resolutions without bringing frame rates to a crawl (or some trade-off mixture of both).

What use is Quincunx AA at 1,600 x 1,200 in Medal of Honor with a GeForce3 Ti 500 if it crawls? I'll take the jaggies and pixel popping, thanks. However, the NV25-powered Ti 4600 debuts NVIDIA's **Accuview AA Engine** (patent pending), which not only takes up a lot of die space, but vastly improves upon previous performance with AA engaged. Utilizing a hardware-implemented, high-resolution multisampling (snazzier than supersampling) technique, including 2X, 4X, good ol' Quincunx, and a new 4XS mode, the Ti 4600 is better equipped to allow full scene anti-aliased gaming. NVIDIA hopes it will become the de facto standard with today's games.

Thanks to the advancements NVIDIA has made with bandwidth as discussed above, AA gaming does actually work without the significant performance penalties that plagued older 3-D graphics chips. You can turn AA on with all of your current games and get the benefit of this now, which is groovy, I think. Going forward, developers will probably clog the pipes with new 3-D engines requiring even more horsepower, but that is the nature of the beast.

NVIDIA has done a turnabout and leveraged its TwinView technology from the GeForce2 MX, improved upon it (thanks to former Appian talent), and added it to the NV25 core, calling it **nView**. On the hardware side, the core sports dual integrated 350MHz RAMDACs, making additional external components unnecessary. The software is much more user-friendly than, though similar to ATI's Hydravision (also by Appian) with an 11-step setup wizard to have you up and running multidisplay Windows features. (Transparency is a particular favorite gimmick for comparing benchmark graphs.) Although there's still room for improvement before nView can surpass Matrox's DualHead, hardcore 3-D gamers no longer have to choose between multidisplay capabilities and really fast games.

Another new feature of NV25's core is the **VPE (Video Processing Engine)** for video decode and filtering. The VPE supports IDCT acceleration for MPEG-2/DVD/HDTV playback and per-pixel de-interlacing (let's hear it for bob and weave).

Bottom Line

New technology is certainly exciting stuff, but before you get carried away and wrapped up in all this innovation, here are a few notes on what I really think:

The positives. Upgrading from a pre-GeForce3 card will slam the door firmly on jaggies and pixel popping as you drive/fly/walk past telegraph wires in games, and Comanche 4 has some nice chopper rotor wash water ripple effects and a bit of nifty AI provided by the CPU, thanks to work offloaded by the G4's GPU. With a GF4 Ti 4600, you will no longer need to play existing games aliased. Anti-aliasing is now what 32-bit became several chip generations back: a given. You will gain faster frame rates all around and the boost in fill rate and bandwidth will let you play at higher resolutions, such as 1,280 x 1,024 or 1,600 x 1,200, which visually improves any game. The Ti 4600 is the new 3-D champion DX8-class product and lays the groundwork for future innovation in games. Note that word "future."

The negatives. NVIDIA's extremely well-executed press event didn't give much hope of seeing real content take advantage of the GF4's monstrous capabilities in the near future. There were demos aplenty, showing off all kinds of neat visual effects, but when I get home, I play games from today, not demos, and Medal of Honor doesn't have anisotropic-furred Wolves. Doom III may yet be an exception, but don't expect games you are playing today or over the next few months to show evidence of amazing pixel and vertex shader effects like the demos you can download from the NVIDIA Web site.

Game developers just can't keep up with this six-month merry-go-round of 3-D chip upgrades. After all, their games take at least 18 months of development. This is likely why so many game developers

Upgrading from a pre-GeForce3 card will slam the door firmly on jaggies and pixel popping.

How The GeForce4 Ti 4600 Stacks Up

	GeForce4 Ti 4600	GeForce3 Ti 500	Radeon 8500
3DMark 2001	9786	8043	8447
3DMark 2001 (Nature)	43.2	28.4	43.7
Quake III NOAA	214	207.9	196.5
Quake III 2XAA	189.7	120.2	89.5
Serious Sam TSE	106.6	74.6	45.7

*Tested with an Athlon XP 2000+ WinXP Pro at 1,024 x 768 x 32

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

flocked to the Xbox, where the hardware and API would stand still long enough to be fully exploited. That makes economic sense for them, but it leaves us PC users, with so much more power and capability, scratching our heads and playing games that don't harbor many of Halo's 3-D effects.

The Fast Lane

Games will continue to play catch up with your hardware, so if you feel peeved at having bought a GeForce3 Ti 500 only a few months ago, you needn't. Doom III will look lovely on it, and so will upcoming games using the Quake III, Unreal Tournament, or LithTech 2.0 engines, which have all been around for ages now and were probably designed on platforms using even older GeForce chips anyway. The technical director's job in game development is to deliver a game that can also be played on slower legacy hardware so it sells more than 12 copies. For early adopters, it is like owning a really fast sports car but only driving in 25mph residential areas. You could go faster, but you'd just get pulled over by the pixel police.

That said, I do own a really fast sports car even though I mostly drive in residential areas. Of course that doesn't mean I recommend you all do the same. But if $400 isn't a hardship, and you won't go ballistic come COMDEX when NVIDIA's next-in-line (NV30?) is likely to come out, go for it. Who knows what NVIDIA will bring to the forum by then. Will it be faster? Yes. Will it encompass technology from 3dfx and Gigapixel's white paper engineering coffers? Well you can see that full scene anti-aliasing and occlusion culling have become of prime importance, so I wouldn't be too surprised to see some sort of dual chip SLI-type arrangement pop up as the latest bit of whiz-bang technology. And, of course, we will all want it.

Expect Ti 4600 boards from VisionTek, MSI, and ASUS to be priced around the $400 mark. If that's too pricey, you could always drop down a notch to the $299 Ti 4400 (core and memory clocked at 275MHz) or the $199 Ti 4200. ▲

by Alex "Sharky" Ross

NVIDIA GeForce4 MX460

Not everyone can afford a new GeForce4 Ti. The real cash is made in the mainstream and value sectors, where NVIDIA has had plenty of success with its GeForce2 MX family. Enter the successor: the GeForce4 MX lineup, featuring the NV25, no sorry, the NV20, whoops, I mean the NV17 chip. It's all fun and games here until the consumer gets into a muddle, right? The only real controversy at the GeForce4 launch event was the GeForce4 branding of a family of products set to use the NV17 chip.

The fuss this naming kicks up does have some substance. The NV17 lacks the fully programmable pixel and vertex shader engine you'll find on the NV20 (GeForce3) and NV25 (GeForce4 Ti), which is what true DX8-compliance and the push to enhance games of the future is really all about. Instead, the NV17 borrows from the NV15 (GeForce2) by incorporating the NSR (NVIDIA Shading Rasterizing) T&L engine, which, according to NVIDIA's marketing material, is up to DX8 snuff. Developers say it isn't.

Without fully DX8-compliant pixel shaders and limited support for vertex shaders, games of today will still run fast on the NV17, but mainstream users won't be able to reap the benefits of programmable pixel and vertex shader effects. The catch-22 nature of innovation makes it easy for NVIDIA to justify this. At the high end, where fewer boards are sold, they press developers to push tomorrow's 3-D visuals with NV25, but you're more likely to find a mainstream board (NV17) in a slower system, which couldn't take full advantage of power hungry, next-gen features anyway. So you have the option of not paying for something you can't use.

The 0.15-micron NV17's theoretical maximum 1.2 billion texels per second fill rate and 38 million triangles per second throughput are impressive. The GeForce4 MX460 I tested was clocked at 300MHz and came with 64MB of DDR-SDRAM clocked at 275MHz, integrated dual 350MHz DACs, and Dual Channel TMDS Transmitters for Digital Flat Panels. The NV17 has many of the same features as the NV25: the Accuview AA, VPE (Video Processing Engine) for DVD and HDTV playback, and nView. Visibility subsystem improvements are all there.

The NV17 also wears the LMA II (two crossbar memory controllers instead of four, a la NV25) badge to help you pay your taxes when it comes to bandwidth. When benchmarked against the competition, the NV17 out runs anything in its class. You're left with a VERY affordable and quick 3-D card that will rip up today's games and do wonders in the business space, thanks to nView. OEMs will also make cheaper and slightly less able MX440 and 420 cards. Hardcore gamers on a budget may want to avoid the $199 GeForce4 MX460 and wait for the arrival of a similarly priced GeForce4 Ti 4200 product. ▲

by Alex "Sharky" Ross

GeForce4 MX460
$199
NVIDIA
(408) 486-2000
www.nvidia.com

How The GeForce4 MX460 Stacks Up

	GeForce4 MX460	GeForce2 MX	Radeon 7500
3DMark 2001	6186	2543	5102
Quake III NOAA	181.2	67	126.5
Quake III 2XAA	108.7	26.2	N/A

*Tested on an Athlon XP 2000+ WinXP Pro at 1,024 x 768 x 32

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Sony DRU110A/C1

The DRU110A/C1 is a Ricoh-made, Sony-branded DVD+RW and CD-R/RW combo drive that sits toward the top of the current DVD+RW heap in terms of speed. It comes with a solid software bundle—B's Clip and Recorder Gold, Sonic Solutions' MyDVD, and InterVideo's WinDVD—and has a doable 2MB buffer, which is on par for recordable DVD drives.

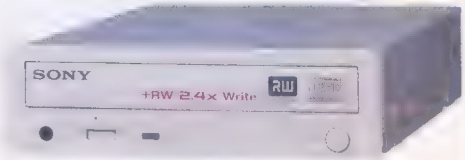
The DRU110A/C1 supports Windows 98SE/2000/Me; it works with XP, but Sony doesn't list XP support in the system requirements. Sony also doesn't list specific system requirements for DVD authoring. The basic system requirements are a PC with a Pentium II 400MHz processor, 64MB of RAM, and 1GB free hard drive space. But for DVD authoring, I recommend at least a Pentium III 800MHz processor and 4GB free hard drive space for smooth sailing.

In TestaCD Lab's CDTach 98 testing, the DRU110A/C1 had a 3,214KBps (21.43X) average data transfer rate. It maxed out at 3,614KBps (24.09X). In DVDTach 98 testing, the drive had a 3,832KBps (2.84X) average data transfer rate, maxing out a bit better. The drive taxed the test PC's CPU about as much at DVD 2X as other drives have at DVD 1X; CPU utilization during CD tests was also not bad: 15% at 4X, 29% at 8X, and 42% at 12X.

In burn tests, where the drive moved 427MB of data to various Memorex media, it burned to CD-R in 4:52 (minutes:seconds), to CD-RW in 6:57, and to DVD+RW in 5:54. Audio CD and DVD movie playback yielded superb quality, as it didn't falter when track/chapter jumping.

The drive has its pros (reasonable speed, great software) and cons (limited OS support, a tad high MSRP). But if you want DVD+RW now, this is one of the best. ▲

by Cal Clinchard



DRU110A/C1
$549
Sony
(800) 352-7669
(408) 432-1600
www.sonystyle.com/vaio/storage
CPU CPU CPU

HP dvd100i

In the DVD+RW vs. DVD-R/RAM leverage game, HP is pushing the DVD+RW format hard. The dvd100i is the drive you've probably seen in some HP Pavilion desktop systems, including last fall's Pavilion 9995. The dvd100i is a DVD+RW/CD-RW combo drive, and during installation and testing, it gave a solid performance.

We tested the drive in a PC with a 1GHz Pentium III processor, 256MB of RAM, and a 7.8GB hard drive, running Windows Me. The PC also has an ATI Radeon 8500 AGP video card with 64MB of DDR-SDRAM. The test system exceeds the dvd100i's requirements for DVD authoring: Pentium III 800MHz processor, 128MB of RAM, and 5GB free hard drive space. The drive works with Windows 98/2000/Me/XP and, for storage purposes only, with Windows NT 4.0 SP5. The dvd100i is one of the few recordable DVD drives on the market tested to work well with WinXP.

For CD-RW capabilities, the dvd100i is adequate but won't break speed records set by the fastest sub-$200 internal CD-RW drives. The drive has advertised 12X/10X/32X drive ratings. Faced with TestaCD Lab's CDTach benchmarking utility, the drive came up with a 3,186KBps (21.24X) weighted average data transfer rate and a 3,538KBps (23.59X) max data transfer rate. The drive burned 427MB of data to CD-R in 8:02 (minutes:seconds) and to CD-RW in 6:02.

During DVDTach tests, the dvd100i achieved a 3,372KBps (2.5X) average data transfer rate; the max was 3,700KBps (2.74X). The 427MB burn to DVD+RW took a respectable 6:14. Alas, the hardest part of testing DVD drives is sitting down and watching chapters from a DVD video. I went chapter-jumping with "The Matrix," and the dvd100i responded quickly and smoothly. Audio CDs sounded great, as well. Looking at the overall DVD+RW drive market today, the dvd100i is sitting pretty. ▲

by Cal Clinchard

dvd100i
$499
Hewlett-Packard
(888) 999-4747
(650) 857-1501
www.hp.com
CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Olympus C-3020 Zoom

C-3020 Zoom
$599
Olympus
(800) 347-4027
(631) 844-5000
www.olympusamerica.com

Six hundred bucks can get you a lot of digital camera. As evidence, I present the C-3020 Zoom from Olympus, the latest addition in the company's popular C-3000 line. Stuffed with goodies, the 3020 will sate the cravings of any advanced amateur.

Here's what you get: a 3.2-megapixel CCD with 2,048 x 1,536 resolution capability (save shots as JPEGs or TIFFs); 3X optical zoom lens (32mm to 96mm equivalent in a 35mm camera) and 2.5X digital zoom; a strikingly clear 1.8-inch TFT monitor; a 16MB SmartMedia card; and a Macro mode that focuses as close as eight inches.

There are several preset scene modes, such as Portrait and Landscape, and fully manual modes for exact control over options from the ISO setting to shutter speeds. The programmable My Mode stores user-defined settings (basically a personalized scene mode) for instant use, so that control twiddling doesn't take over your life.

The 3020 has an ultra-friendly menu system. You can program the three functions you change most frequently (such as resolution) into a shortcut, which greatly reduces button punching. When necessary, rummaging through the logical menu tree is painless.

Suffice it to say that test photos were extraordinary. Indoors and out, in macro or normal shooting modes, photos were clear and colorful. This is due in part to the color-management system that enhances colors depending on the mode you select; portrait shots have improved skin tones, while landscape shots emphasize blues and greens.

Although the 3020 milks four AA batteries for all they're worth, regular batteries won't last long. Go with CR-3Vs or rechargeable NiMH or nickel-cadmium batteries instead. You'll likely find the 3020 online for about $500. At that price you won't find a flashier, more functional digicam. ▲

by Nathan Chandler

Toshiba PDR-M25

PDR-M25
$279
Toshiba
(800) 550-8674
(949) 583-3000
www.toshiba.com

The onslaught of low-cost, entry-level digital cameras continues as manufacturers race to exploit consumers' hunger for these in-triguing devices. Next on my list is the Toshiba PDR-M25, a 2.2-megapixel digicam with a suggested retail price of $279.

If looks were all that mattered, the M25 would beat its M71 and M11 cousins hands down. Where the latter cameras were blocky to the point of being ugly, the M25's graceful curves and improved color scheme make it much easier on the eyes. More pleasing yet is this camera's 3X optical zoom and 1,792 x 1,200 maximum resolution. If you prefer, you can quickly change the resolution to 860 x 600 and alter the image file size using buttons atop the camera. The photos are stored to the smallish 8MB SmartMedia card.

The lens' 6.2mm-18.6mm F2.9-F3.02 ability is equivalent to 38-114mm on a 35mm film camera. In normal mode, the M25 focuses from 15.7 inches to infinity. Macro mode lets you get as close as 3.15 inches to your subject before things start to blur. The optical zoom works fairly smoothly and quietly, but don't expect fast focusing. Take care to protect the lens, as it protrudes from the camera's body, and the worthless lens cap falls off with the slightest nudge.

Some indoor shots taken in Auto mode and well within range of the flash were terribly underexposed. Outdoor photos were similarly underexposed, no matter if the flash was on or off. Altering the ISO settings did little to improve the M25's picture quality. And we didn't get many chances, as our four AA batteries went dead incredibly quickly.

Toshiba's higher-end PDR models strike a good balance with quality and features. The M25 is a mixed personality; it looks nice on the outside, but its performance will impress only novices. ▲

by Nathan Chandler

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Introducing the new Palm™ m500 handheld. Inside its sleek little chassis, we've added an expansion slot so you can turn it into the ultimate photo album or eBook. The optional SD cards also let you back up or increase memory, or even access worldwide travel guides. As for included applications you can download email, import and update Excel spreadsheets, even customize and manage web content with the MyPalm™ portal. We also included mobile connectivity software—add a modem or compatible mobile phone and your information can be accessed wirelessly. It's time to mobilize

Simply Palm™
palm.com

the last thing you bought
this expandable
had an elastic waist.

palm powered™

Available at: Best Buy Circuit City CompUSA Office Depot OfficeMax Staples

SD expansion cards are sold separately and not included with handheld. SD card shown is an example of available storage capacity. Storage capacity may vary. The m500 handheld requires an Internet account, modem or data-enabled mobile phone and/or third-party software for email and Internet access, sold separately. Screen image is simulated. © 2001 Palm, Inc. All rights reserved. Palm, Simply Palm, MyPalm, Palm Powered, the Palm Powered logo and the Palm logo are trademarks of Palm, Inc. or its subsidiaries. Other products and brand names may be trademarks of their respective owners.

Epson Stylus Photo 890

Stylus Photo 890
$299
Epson
(800) 463-7766
(562) 981-3840
www.epson.com

CPU CPU CPU CP

When it comes to printing photos, no company competes with Epson's Stylus Photo models. The 890 keeps the Epson train rolling along smoothly, sporting 2,880 x 720 resolution and six-color printing that blows away most four-color inkjets.

Text printing wasn't a priority for me with the 890; it is a photo printer, after all. Still, I printed a 10-page text-only document. The first-page-out time was 0:16 (minutes:seconds), and the last page was finished in about 2:00 (4.6ppm). Because draft-mode text printed at 120dpi (seriously), text was light and splotchy. Who cares? A Word text doc interspersed with some simple graphics printed in less than 4:00, a rating of 1.6ppm. Three PowerPoint slides printed in just more than a minute, a speed of about 2.3ppm.

With these preliminary routines out of the way, I licked my lips, whipped out some photo paper, and sent a massive full-page photo to the 890. Then I took a nap, cooked dinner, ran a few errands, and chased off a few raccoons taunting me from outside. In other words, I had some time to kill; at highest quality, the 890 needed 25 minutes to put the photo to rest. That's OK by me, though, because photo quality this good is worth waiting for. Color gradations and shading are much smoother than you'll see on any four-color printer, thanks to the light cyan and light magenta ink included. Flesh tones are noticeably richer and more accurate.

A word of caution for those unfamiliar with Epson's proprietary micro-piezo technology: Stick with Epson paper. We used Kodak's excellent photo paper, and inks didn't set correctly. A couple of weeks later, the photo had permanently adhered itself to another sheet of paper. Use Epson's good stuff, though, and you'll be pleased with the stunning photos you see. ▲

by Nathan Chandler

Canon S520

S520
$149
Canon
(800) 652-2666
(714) 438-3000
www.usa.canon.com

CPU CPU CP

Canon continues to tweak its S-series printers with mixed results. The S520 is a faster version of last year's S500, but the S520 doesn't up the ante in the quality arena. That's not to say this is a boring product, as you'll see.

The S520 features 2,400 x 1,200 resolution and 5-picoliter droplets, in addition to a 10ppm (black) manufacturer rating. Canon's labs also claim inexpensive printing, at about 11 cents a page for color and 2 cents for black text. Following the lead of the S600, the S520 uses four individual ink cartridges to cut down on ink waste.

This is a noisy printer. It clatters and groans like an unshod, angry mule. That's OK with me, though, because the printer does the job. I was happy to see my 10-page text file drop in only 1:20 (7.5ppm). Sadly, text quality seemed worse than with the S500, with significant ink wicking and especially fuzzy bold print.

Line-art graphics paired with text printed at about 2ppm, and PowerPoint slides printed at 3.5ppm. That's plenty fast for most folks, and best of all, the images featured bandless, accurate colors. As with all recent Canon printers, the S520 ripped through high-res photos with ease. Even our most complex photo (an intricately shaded flower shot) printed in less than three minutes. After I "dropped" the driver into Standard mode, I reprinted; Standard mode hacked another minute off the print time and didn't cause any loss in photo quality.

Photos have improved over last year's prints. Gone is the reddish cast that ruined prints featuring flesh tones. However, this improvement comes at the expense of other colors, which have lost some richness. In spite of this drawback, Canon has cemented itself as the speed king of inkjets; the S520 will burn rubber (or perhaps more appropriately, paper) in SOHO applications everywhere. ▲

by Nathan Chandler

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Philips PSC706 Acoustic Edge

Most computer users think of Creative Labs when they think of sound cards, but Creative Labs is hardly the only game in town. Hercules and Voyetra Turtle Beach have products that give a Sound Blaster a run for its money. Philips also is entering the fray with its PSC706 Acoustic Edge.

The Acoustic Edge is a PCI sound card that has a Philips ThunderBird Avenger DSP. The card has a hardware polyphony of 64 voices, as almost all sound cards do these days. The card also has a software polyphony of 512 software voices, so plenty of audio effects are available. The Acoustic Edge is compatible with all the important audio standards, including DirectSound, DirectSound3D, EAX (1.0 and 2.0), and A3D 1.0. The sound card works with Windows 9x/NT 4.0/Me/2000.

If you're lucky enough to have a 5- or 6-piece speaker system, the Acoustic Edge has you covered. It supports 5.1 sound and includes a Dolby Digital decoder for DVD movies. One of the Acoustic Edge's unique features is QXpander, an algorithm for two speakers that creates a wider audio field, so it doesn't *sound* as though you're only using two speakers. The Acoustic Edge also has a feature called QMSS (QSound Multi-Speaker System), an algorithm that plays distinctly different sounds through each channel. QMSS can use the effect with audio CDs and MP3s, but it's best for video games.

I checked out a few audio tracks using the sound card and generally liked what I heard. The bass was excellent, although higher frequencies did sound a little tinny on occasion. Still, I liked the overall sound quality.

I played several rounds of Half-Life, and the Acoustic Edge's 3-D audio quality impressed me. The bass really thundered in the game, and the ambient sounds also were quite good.

The Acoustic Edge costs a bit less than the high-end sound cards from Hercules and Creative Labs, and it has a couple of unique features I like. ▲

by Michael Sweet

PSC706 Acoustic Edge
$85
Philips
(800) 835-3506
www.pcsound.philips.com

Western Digital Caviar WD1200JB 120GB

A hard drive's cache memory saves recently requested data in case its host PC wants it again soon. Because a drive can spit out cached data several times faster than it can read it from its disks, it's not a bad idea for manufacturers to bump up the cache buffer size. Western Digital recently did just that with its 7,200rpm,120GB Caviar WD1200JB.

This $389 special edition drive has an 8MB cache, while the regular $325 WD1200BB keeps its 2MB cache. Both models are near the outer limits of capacity for EIDE drives, but the new WD1200JB's bigger cache makes it the current best performer. However, you're more likely to notice a performance gain from its big cache in a server or video-editing scenario than in a single-user desktop.

Using a 600MHz Pentium III-EB system with 128MB of RAM, a HighPoint DMA/100 controller, and Windows Me, we benchmarked the WD1200JB with HD Tach 2.61 and Winbench99. The drive outpaced its 2MB-cache version by a whisker in most tests and did well enough to grab the top spot in our EIDE Top 5 list. It's not the biggest or the stoutest EIDE drive (it has a low 200G nonoperating 2ms shock tolerance), but it's now the fastest.

Starting with server-oriented tests, the WD1200JB had a 13.2ms random access time, a 6,980KBps Business Disk score, and a 26,100KBps High-End Disk rating. Its average read rate was 40.5MBps (49.4MBps maximum), and its average write rate was 23.1MBps (34.2MBps maximum).

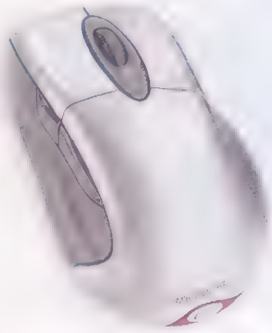
It's clear this drive rocks on all fronts. At $389, though, it's up in SCSI price territory; hardcore-tech types prefer SCSI drives for their servers. However, EIDE's lower cost means you might get about three times the capacity in the WD1200JB compared to a $400 SCSI drive without giving up much, if any, speed. ▲

by Marty Sems

Caviar WD1200JB 120GB
$389
Western Digital
(800) 275-4932
(949) 932-5000
www.westerndigital.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Microsoft Wireless IntelliMouse Explorer



Wireless IntelliMouse Explorer
$74.95
Microsoft
(800) 426-9400
(425) 882-8080
www.microsoft.com

The Wireless IntelliMouse Explorer is Microsoft's first cordless optical mouse, and its 6,000-pictures-per-second rate is a whopping four times faster than that of most optical mice.

The mouse operates on a standard 27MHz radio frequency. A tiny, stylish, USB receiver receives signals from as far as about six feet.

Unfortunately, I couldn't keep the mouse long enough to test Microsoft's claim that the two required AA batteries will last for months, but the device is built to preserve power. The mouse's light dims on lighter surfaces, and sensors detect the presence of your hand. When you take your hand away, the mouse goes into sleep mode.

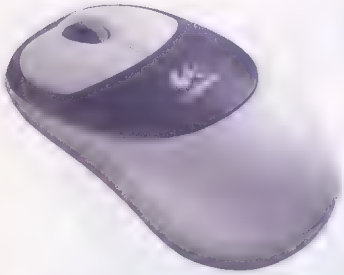
The five-button mouse has a textured scroll button and thumb-operated back and forward buttons for Web use. Unfortunately, the forward button is awkward for small-to-average-sized hands. The sculpted sides of the mouse support your thumb, ring finger, and pinky finger. That contoured shape makes it easy to lift and reposition the mouse without accidentally clicking a thumb button. You can program each of the five buttons to perform one of 38 different functions, including Keystrokes, which lets you enter a word in text instantly or perform another key combination, such as CTRL-S, by clicking the designated button.

Unfortunately, Windows 98 SE was a slight mousetrap for my review unit. Despite brilliant performance with Windows Me, the mouse's Orientation settings posed a problem with Win98. While configuring the orientation, the pointer disappeared. I had to resort to the Task Manager and End Task. Microsoft sent me a review unit, so I'm hoping these problems were corrected in the final product.

Other than the Win98 orientation problem, the Wireless IntelliMouse Explorer didn't leave much to desire. This creature will stir on many desktops with its customizable buttons, smooth operation, and comfortable design. ▲

by Kylee Dickey

Logitech Cordless Optical Mouse



Cordless Optical Mouse
$49.95
Logitech
(800) 231-7717
(510) 795-8500
www.logitech.com

The typical office worker's desktop is cluttered with coffee mugs, staplers, picture frames, and even the occasional toy. But Logitech's Cordless Optical Mouse has nothing to fear from desktop dust or piles of paper and knickknacks.

The triangular, translucent-blue receiver that comes with the mouse connects to either a USB or PS/2 port (using the bundled PS/2 adapter). Setup and installation were simple, and the mouse performed honorably as evidenced by the smooth, predictable motion of the pointer. I wasn't able to keep the mouse long enough to test Logitech's claim that two AA batteries would last up to three months, but I was able to check the battery status at any time by clicking the MouseWare icon on the Taskbar.

As its name implies, this mouse has no cord to get tangled around objects such as staplers or boxes of paper clips, and its optical technology makes it immune to the dust collecting on top of many desktops. The mouse's radio signal doesn't need a clear path to the receiver. My attempts to thwart mouse-receiver communication by obstructing the path with a stack of *Computer Power User* issues failed.

The Cordless Optical Mouse is designed for either right- or left-handed users. People with small- to average-sized hands should find the mouse comfortable; larger-handed users may find operating the mouse a little awkward. The scroll wheel contributes to the ergonomic qualities of the mouse; you can scroll through documents easily and also access favorite Web sites quickly using Logitech's WebWheel software. Each of the three mouse buttons is programmable with one of 53 functions.

If you're a fan of Logitech's mice and you're willing to sacrifice the thumb button of the Cordless MouseMan Optical, you'll want to check out the Cordless Optical Mouse. It has a lower price tag and offers ambidextrous access to the same cordless optical technology. ▲

by Kylee Dickey

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Ashton Digital Portfolio One

Ashton Digital's Portfolio One reminds me of a Monet. From a distance, it looks great, but when you get up close you can see all its gaps.

Specifications. The Portfolio One looks best on paper. In fact, the unit we received looked impressive. Our model shipped with a 1GHz Pentium III processor and 256MB of RAM. A 30GB hard drive provided ample storage, and a DVD/CD-RW combo drive added flexibility. Add the integrated floppy drive, and you have a three-spindle device that measures 1.5 inches high x 12.68 inches wide x 10.9 inches deep and weighs 7.2 pounds. The display is large, measuring 14.1 inches diagonally.

The least impressive statistic on the Portfolio One is its Twister chipset. Twister is an integrated chipset that combines a VIA motherboard chipset with an S3 graphics chipset. This configuration doesn't include dedicated video memory, so the S3 chipset must borrow some RAM from system memory. This always causes a performance hit.

Design. The design of the Portfolio One isn't bad. The navy and silver case looks attractive. The palm rest extends past the LCD when it's closed, providing access to multimedia controls on the front of the palm rest. A remote control receiver plugs into a USB port and lets you control DVD playback from across the room. The remote control receiver, however, is large and unattractive.

Between the available TV out and the digital sound jacks, the Portfolio One can serve as a standalone DVD player, just not a very good one. The number of dropped frames during DVD playback was painfully obvious, especially during slow camera pans. Video constantly stuttered, and the sound even dropped out for a second at one point.

The case itself is mostly solid, but I noticed a few weak points on the back of the LCD. When opening and closing the lid, I heard a clicking sound around the LCD casing that suggested it wasn't well constructed.

The keyboard's keys have decent size and spacing; the layout isn't great, but it's not bad. My chief complaint is the positioning of cursor control keys such as PAGE UP and PAGE DOWN to the right of the ENTER and BACKSPACE keys. If you reach for the wrong key, you could find yourself accidentally deleting characters in another part of your document. I noticed the keyboard seemed to flex a little when pressing keys near the center.

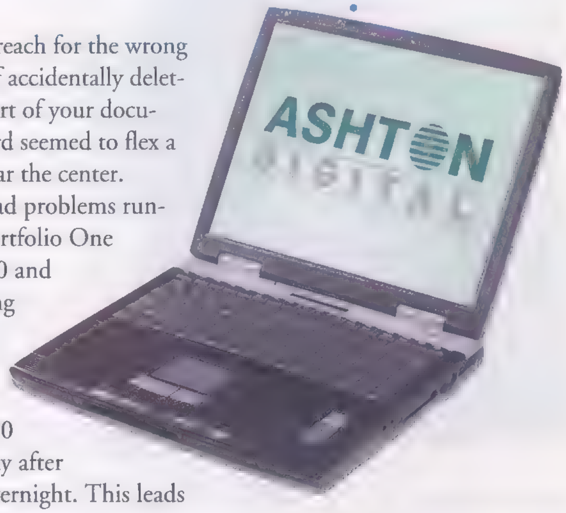
Performance. Our lab had problems running Video 2000 on the Portfolio One after running SYSmark2000 and SYSmark2001. After turning the notebook off for a few hours, the lab was able to get Video 2000 to run successfully. Video 2000 scores increased the next day after leaving the notebook off overnight. This leads me to believe the unit may have some cooling issues. In a more standard work environment, this may not be an issue. Nevertheless, we review all notebooks in the same manner, and few other notebooks exhibit this type of behavior. We did contact Ashton Digital about the problems we experienced, but its representatives were unable to explain the snags we ran into.

Then there's the issue of performance. With a 1GHz processor, I would expect strong benchmarks, but I was disappointed yet again. The Portfolio One managed a SYSmark2001 overall score of just 66. This equates to a 103 in SYSmark2000. By way of comparison, the nearest 1GHz system, which used a converted desktop processor rather than a true mobile processor, posted a SYSmark2000 Overall score of 131.

Video 2000 scores were more competitive despite the Twister chipset. The highest Video Mark score we received was 1,729 after letting the device cool all night. Our initial Video Mark score was 1,565 after letting the notebook cool down for a few hours.

Final word. Ashton Digital did promise to send us a second unit, but it was unable to deliver. The best I can say about the Portfolio One is it makes other bad notebooks look good by comparison. Actually, I'd go a lot easier on the Portfolio One if it were about $1,000 less, but for its $2,200 price tag, you can buy a system that actually performs and is more than a glorified portable word processor. ▲

by Chad Denton



Portfolio One
Ashton Digital
$2,194
(408) 942-8877
www.ashtondigital.com

Features

Processor: 1GHz Pentium III
RAM: 256MB/384MB
Display: 14.1-inch TFT
Dimensions (inches): 1.5 x 12.68 x 10.9
Weight (pounds): 7.2
Hard Drive: 30GB
Optical Drive: DVD/CD-RW Combo
Connectivity: Modem; Ethernet
Final Word: The notebook does have some nice specs, but the specs don't translate into performance. I can't think of a reason to justify its price.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Dell Inspiron 4100

The Dell Inspiron 4100 is a nice compromise for highly mobile individuals who aren't looking for a desktop replacement but who also don't want to fudge on performance. The Inspiron 4100 has the power and performance of a desktop replacement system but weighs a pound or so less.

Specifications. The test unit Dell sent us was loaded with the fastest mobile processor currently available, a 1.2GHz Intel Pentium III-M. The notebook was also installed with a generous 256MB of PC133 SDRAM (as much as 1GB of RAM is supported). Our 4100 also included an NVIDIA GeForce2 Go video adapter with a generous 32MB of RAM. The combination of the SDRAM, PIII-M processor, and a 14.1-inch SXGA+ display make the 4100 a portable multimedia rig.

The Inspiron 4100 is slightly smaller than the Inspiron 8100, measuring 1.47 inches high x 12.5 inches wide x 10 inches deep. The weight depends on what's installed in the modular bay. The unit weighs roughly 6 pounds with an optical drive; with the space saver in the modular bay, the unit weighs about 5.5 pounds.

Although the 4100 doesn't ask you to sacrifice performance for portability, it is only a two-spindle system, meaning you can only have one internal drive in addition to the hard drive. A modular bay accepts optical drives (including the DVD/CD-RW combo drive that was sent with our unit), a floppy drive (standard with the 4100), a Zip 100 drive, or a second battery. If you don't mind the floppy drive dangling from the 4100's parallel port, you can use the modular floppy drive as an external floppy drive, leaving the modular bay free for an optical drive.

Design. The Inspiron 4100 looks similar to the 8100, but it's smaller. The smooth curves the notebook has give it a sharp look, and snap-on palm rest covers add a little personal customization. The 4100 meets anyone's input preference with both a touch point and touch pad.

The keyboard is very good. Keys are nice and large with a good range of motion. The keyboard layout is also good, with full-sized ENTER and BACKSPACE keys. Cursor control keys, such as PAGE UP and END, are in the upper-right corner where you're unlikely to accidentally press them while typing. Overall, the keyboard is very comfortable to use.

The 4100 is solidly constructed, although I'd like to see a little more protection around the LCD. There was also a very slight give in the palm rest, but nothing to be too concerned about.

The display is bright, readable, and sharp with a resolution of 1,400 x 1,050. At such a high resolution, text can be difficult to read, but you can bump up the size of your Windows fonts to accommodate for the higher resolution.

The high-resolution display is perfect for DVD movies, and the 4100 provided flawless DVD playback. The video was very sharp, and we didn't notice any skips or pauses in playback. The onboard speakers were slightly above average for notebook speakers.

Performance. With the 4100's impressive specifications, I expected excellent performance scores, and the 4100 delivered. A 118 mark in Office Productivity, 144 in Internet Content Creation, and 130 Overall SYSmark2001 score were slightly better than I anticipated.

Our labs typically run Video 2000 on notebook systems, as well, but Video 2000 isn't currently compatible with Windows XP, so we skipped the test. We could have run 3DMark, a test typically performed on desktop systems, but not all notebooks can run 3DMark, so the numbers wouldn't have been as useful without other systems to compare the scores to.

Final word. The 4100 proves you don't have to lose performance when shedding a few pounds. As often as I use a floppy drive these days, I don't even think the move from a three-spindle notebook to a two-spindle notebook is that big of a deal. In addition to its performance, the 4100 has a number of nice design ideas, such as the ability to use the modular floppy drive as an external drive and the inclusion of both a touch point and touch pad. ▲

by Chad Denton

Inspiron 4100
Dell
$2,376
(800) 999-3355
(512) 338-4400
www.dell.com

Features

Processor: 1.2GHz Intel Pentium III-M

RAM: 256MB/1GB

Display: 14.1-inch TFT

Dimensions (inches): 1.47 x 12.5 x 10

Weight (pounds): 6.01

Hard Drive: 20GB

Optical Drive: DVD/CD-RW Combo Drive

Connectivity: Modem, Ethernet

Final Word: Slightly lighter than the Inspiron 8100 but with the same strong performance at a good price.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Gateway 700X

Gateway has several home PCs in its top-of-the-line 700 series, including the 700SE and 700XL. We checked out the 700X system, which is one of the most powerful in the 700 line. The 700X is the kind of PC that everyone in your home will find a use for, whether it's office work, games, homework, or watching DVD movies. Gateway changed the specifications for the 700X after we tested it, but we still wanted to show you what this system is capable of.

Specifications. The Gateway 700X has a 1.8GHz Intel P4 and uses the Windows XP Home operating system. The PC has a 400MHz bus speed, as you'd expect with an Intel system, and includes a generous 512MB of fast RDRAM.

Gateway includes ATI's latest video card, the ATI Radeon 8500, in the 700X. The Radeon 8500 is a powerful and speedy video card that includes 64MB of DDR-SDRAM; it's considered one of the best video cards available today. The system includes Gateway's 15-inch FPD 1510 flat-panel display, which looks sharp and is a real space saver compared to a CRT monitor. For audio hardware, the 700X has a Sound Blaster Live! Value sound card and a five-piece set of Boston Acoustic speakers.

Gateway includes some nice storage hardware in the 700X. It has a 16X DVD drive and a 16X/10X/40X CD-RW drive, so you'll be able to burn CDs quickly. The 700X also includes a 120GB hard drive, which should be plenty of storage room for any home PC user. This PC has both a 56Kbps modem and a 10/100 network adapter.

Design. The 700X may have a lot of room for storing files, but there's not much room left for adding internal components. Of the system's five PCI slots, only one is unused. Both of the 5.25-inch drive bays are already occupied. However, the system does have five 3.5-inch bays, three of which are available. It'd be nice if another PCI slot was available, but the 700X already includes most of the internal components a user could want, so this probably won't be a big issue for the majority of home users.

What the 700X lacks in room for internal components, it makes up for in ports for external components. The system has one serial and one parallel port, as almost all systems do, but it also has three IEEE 1394 ports for high-speed peripherals. There are also four USB ports. Gateway throws in a Microsoft optical mouse, which I like much better than a standard mouse.

Performance. The 700X made an impressive showing in our benchmark tests. The system's Overall SYSmark2001 score was 176, which is better than average. Most PCs in this performance range score about 160. The Office Productivity score was 159, and the Internet Content Creation score was 194, which is quite good. I was also pleased by the 700X's 3DMark2001 score of 7,411. That's one of the highest 3DMark2001 scores I've seen in awhile; it's no doubt due to the excellent Radeon 8500 video card.

The 700X isn't just for work, of course. To test its fun side, I popped in a DVD and watched a few chapters of "Armageddon." Initially the DVD software didn't work, but after I reinstalled the software and restarted the machine, the software worked fine. The video looked pretty good, although it wasn't the best I've seen. The audio was excellent. I like the speakers that Gateway included with this system.

I played several rounds of Quake III next. Because this system uses a flat-panel display, the maximum resolution is limited to 1,024 x 768. I didn't have any complaints, though; the game looked great and ran very smoothly at this resolution. As with the DVD movie, the audio during gameplay was solid.

Final word. The 700X excels at just about everything you'd use a PC for. It's an excellent home office PC that you can use for entertainment after you close up shop. It would also make a good home video-editing studio. All that's missing is a DVD+RW drive. ▲

by Michael Sweet

700X
$2,000
Gateway
(800) 846-4208
(605) 232-2000
www.gateway.com

CPU CPU CPU CP

Features

Processor: 1.8GHz Intel Pentium 4

RAM: 512MB RDRAM

Hard Drive: 120GB

Optical Drive: 16X DVD; 16X/10X/40X CD-RW drive

Connectivity: 56Kbps modem; 10/100 network adapter

Graphics Accelerator: ATI Radeon 8500

Monitor: 15-inch flat-panel display

Chassis: Mid-tower

System Use: Entertainment

Final Word: Fast, all-purpose home PC

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Anand Lal Shimpi

NVIDIA Brings The 4th Round Of GPUs

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, *CBS' 48 Hours and* Fortune. *His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

Every six months NVIDIA releases a brand new graphics processor causing us all to ask the same question—is this one worth upgrading to? Just recently NVIDIA released their GeForce4 Ti and GeForce4 MX product lines, with six new cards it's time to answer that question.

The GF4 core, also known as NV25, is composed of 63 million transistors, 6 million more than the GeForce3. The additional transistors were primarily used for the following features:

A second vertex shader—The NV25 core features the same dual vertex shader setup that is present in the Xbox's NV2A graphics processing core.

> **The GeForce4 MX460 is virtually useless because of the GeForce4 Ti 4200 that costs only $20 more but provides worlds more of performance.**

An improved memory controller—From benchmarks I've run for AnandTech, it is clear that the improved memory controller of the GF4 offers around 15% to 25% improved performance over the GF3.

Multimonitor support—NVIDIA originally chose not to include multimonitor support (called nView) with the GF3 because the die was already so big. Although the GeForce4 is still built on the same 0.15-micron process NVIDIA nView was worth it; after using it for a few weeks now it definitely is. nView is comparable to ATI's Hydravision in functionality and superior to it in ease of use.

Improved Antialiasing—The GF4 has an improved AA engine that allows you to enable AA while taking a smaller performance hit.

The GF4 Ti series also features 128MB of memory found in ball-grid array packages. This new packaging allows for easier routing and higher memory densities.

There are three cards that make up the GF4 Ti series: the Ti 4600, Ti 4400, and the Ti 4200. The Ti 4600 is clocked at 300MHz core with 325MHz DDR memory (effectively 650MHz), the Ti 4400 is clocked at 275MHz core with 275MHz DDR memory, and finally the Ti 4200 is clocked at 225MHz core with 250MHz DDR SDRAM. The Ti 4200 performs at least as well as the GF3 Ti 500 and in many cases it is even faster, especially in newer games and at higher resolutions. The Ti 4400 is up to 20% faster than the GF3 Ti 500 and the 4600 are up to 40% faster than the Ti 500. The three cards are priced at $399 for the 4600, $299 for the 4400, and an aggressive $199 for the 4200.

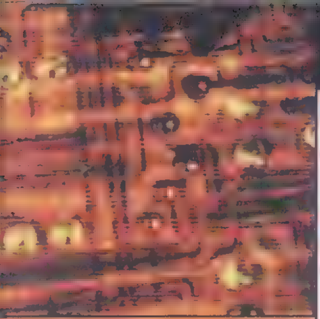
The GF4 MX line is a bit less clear-cut and much more difficult for the uninformed buyer to understand. The GF4 MX is *not* a DirectX 8 compliant part mainly because of its lack of a programmable DX8 pixel shader unit, and thus undesirable for most gamers.

The reason for NVIDIA's removal of the majority of what made the GF3 so attractive was to conserve die space. The GF4 MX does feature a derivative of the GF4's memory core, as well as the same nView and AA support. The GeForce4 MX also includes NVIDIA's VPE (Video Processing Engine), which finally brings iDCT (Inverse Discrete Cosine Transform) to the GPU, which reduces CPU utilization during DVD playback.

Just like the original GF2 MX, the GF4 MX still only features two rendering pipelines compared to the four rendering pipelines of the GF2, 3, and 4. This is an even bigger deal now that memory bandwidth is much more plentiful.

The GF4 MX is segmented in much of the same way as the GF4: with the three available flavors being the MX460 at $179, the MX440 at $149, and the MX420 at $99. The MX460 is virtually useless because of the GF4 Ti 4200 that costs only $20 more but provides worlds more of performance. The MX440 is somewhat attractive for $149; however, you'd be better prepared in the future by going with a GF3 Ti 200 that you can probably get for the same price point. The MX420 uses conventional SDRAM and is a bit faster than the GF2 MX400. The main benefit of the MX420 is that for $99 you can get a card with nView support. ■

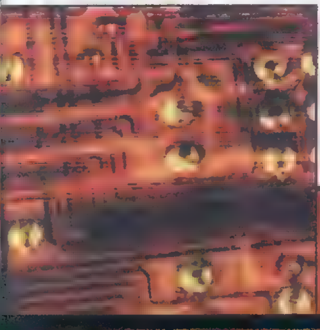
Direct your feedback to anand@cpumag.com.



by Alex "Sharky" Ross

Meet-The-Parents PC

Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently swims in Silicon Valley.



Despite the current economic outlook (aka bloody awful), chip companies are still cranking out releases thick and fast. As much excitement as the NV25, Northwood, and the new iMac (well not that) give a geek like yours truly, it would have been easy to overlook one of the less glamorous announcements—at least I did until I thought about it. Enter AMD's Duron 1.3GHz. Actually, put it on ice for a tick until I construe a couple of laborious scenarios for you. . . .

Scenario One: I am a lucky yuppie

You often wonder who is richer, Bill Gates or Belgium. Although you are not in the same league, your portfolio rivals Prince Harry's pub allowance. Pat yourself on the back. Your car has automatic headlight washers, your kitchen has a programmable fridge, and every console since N64 is piled merrily atop your enormous TV. You have successfully partnered with a member of the opposite tribe (aka not a geek), and there lies the crux. Your technology-challenged spouse came complete with family: your mouse-phobic in-laws. You enjoy their company, but as they don't own a PC, you can't play games, browse the Web, or check your e-mail, and you end up sitting like a lemon on weekend visits.

> If you don't want to sell a kidney, AMD's Duron 1.3GHz will do nicely.

Being a *CPU* reader and a complete geek/PC addict, you've just bought Medal of Honor: Allied Assault (see our review on page 92) and are ready to go storming up the beaches of Normandy. But the shrink-wrap has to stay sealed and the invasion on hold because you promised your spouse a visit to the in-laws. Bugger. But wait. Instead of being a hero in Medal of Honor, you can be a hero with the family. Why not put your PC skills and money to good use and whip up a DIY PC for them? Besides all the joy and productivity you'd bring to their lives, when you go around in future, you can check your e-mail or online portfolio and even play Medal of Honor! If money is too tight to mention, forget the elaborate fairytale in Scenario One and just think about this instead. . . .

Scenario Two: I am a poor student

Being a student, you miss the days of being spoiled at home with PC-related birthday pressies. You are at University and nobody does your laundry or buys you CPUs anymore, so you must now fend for yourself. You have more time than money, and Medal of Honor is in your sights. But that old Pentium II 300MHz just won't butter your muffin. At first glance, a value processor doesn't exactly rev your V8. You crave a $3,000 P4/Athlon XP. But the reality is this: If you don't want to sell a kidney, AMD's Duron 1.3GHz will do nicely. You can Word, Excel, browse, and play 3-D games. Now do you see where I am going with all this storytelling?

Using everyone's favorite price search engine (www.pricewatch.com), you can find all the required peripherals for a sub-$500 gaming PC. Give it a whirl. The Duron 0.18-micron 1.3GHz (Morgan core) sports a multiplier of 13 and a 100MHz frontside bus, double pumped. With 128KB of L1 cache and 64KB of L2 cache, it's well equipped to go head to head with Intel's slightly more expensive Celeron 1.3GHz (based upon the 0.13-micron Tualatin core). Pairing a SiS 735 motherboard with on-board sound and Ethernet ($60) and a Duron 1.3GHz with heat sink and a fan ($105), you can already tell that your kidney is safe. Throw in 128MB of SDR SDRAM ($30), a 300W power supply ($30), a GeForce2 MX200 card ($50), a 20GB 7,200rpm hard drive ($80), and a DVD drive ($40), and you are all set and ready to play some new 3-D games. Of course you'll still need a cheapo ATX case ($25), mouse ($15), and keyboard ($15).

If you've been doing your math and adding up the figures in parentheses, you know that this system comes in at $450 (not including tax and shipping). You've got yourself a bargain. The best part is that a system like the one above (and the one sitting in front of me), will perform quite admirably. Quake III at 640 x 480 hits 170fps and 159fps at 1,024 x 768. Serious Sam at 640 x 480 wasn't shabby either at 93fps. It's amazing what you can get for under $500 these days: a semidecent DV camera, a super-flashy 8-foot hybrid tri-fin surfboard, or best of all, a fully-fledged gaming system, powered by a Duron. ■

If you have a limited vocabulary and just like to say "foo," e-mail me at sharky@cpumag.com.

by Kyle Bennett

Coming Down The Pike

Kyle Bennett is editor-in-chief of HardOCP.com (hardocp.com), one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

It never fails. You're on top of the heap with the biggest and baddest box around until Chester, the geek down the street, gets something bigger and badder. If you're looking to upgrade or build a new box in the months to come, here's what to look for.

NVIDIA-based solutions have reigned supreme in the gaming video card market for a while now. NVIDIA isn't resting on its laurels. On February 5, NVIDIA kicked off its next generation GPU in San Francisco with a swanky party.

At this writing, we're just getting our hands on the technology, but it looks promising. Currently we're testing a sample of NVIDIA's GeForce4 MX 460 GPU, a new midlevel GPU likely to fall into the $150 price range. While still not fully on par with GeForce3 technology, it's pretty astounding to watch it run a Quake III server with 16 players in 1,600 x 1,200 x 32 resolution, sustaining a frame rate of around 80fps. This is a value card to watch for. Then there's the GeForce4 Titanium 4600, packing 128MB of RAM and a phenomenal 300MHz core clock and 650MHz DDR bus. If you want to see your games in high resolution with incredible antialiasing, while pulling very large frame rates, check this one out.

Not to be left out is ATI and its R250 and R300 GPUs. We can't discuss much about these yet, but it looks like the R300 will be very promising and the first true DX9 part we'll see on the market.

My suggestion for a new video card is the GeForce3 Ti 200. When the new stuff hits and drives GeForce3 prices down, this should be a great card at a great price.

My suggestion for a new video card is the GeForce3 Ti 200. When the new stuff hits and drives GeForce3 prices down, this should be a great card at a great price.

The mainboard chipset market has been active recently with the highly successful VIA KT266A and NVIDIA nForce. The VIA KT333 may be available as you read this. The biggest change in the two chipsets is the implementation of 333MHz DDR on the AMD platform. This sounds great, but I think the performance increases will be marginal. The AMD AthlonXP CPU still rides on a 266MHz bus, and we're quickly approaching a point where CPU bus performance will be the bottleneck.

NVIDIA will release a new nForce chipset without an on-chip video solution supplied. This will hopefully bring down the cost of nForce boards. Right now, the nForce is the best integrated-desktop solution available for overall performance.

The Intel i845 chipset is showing off a lot lately with tremendous overclocks and great stability, but many are still going to find the platform a bit pricey.

For the DIYer, keep an eye on the KT266A boards, as well as the KT333 (supporting 266MHz legacy DDR, as well). But don't spend all your pennies on that 333MHz DDR quite yet. Why not go hog wild on 333MHz DDR, also known as PC2700? Simple, even if you see DDR RAM labeled or branded at PC2700, for the most part, it's simply PC2100 parts overclocked to run at PC2700 speed. While I'm writing this, there's still no real PC2700 specification. Of course, this isn't to say these products won't work at 333MHz. They simply do not adhere to the spec—due to its nonexistence.

What about CPUs? If you caught the articles last month in CPU on Intel's Pentium 4, you saw we thought it might be the next best thing for hobbyists. I have since seen 2GHz Northwood CPUs that were OCed to 2.8GHz with simple air cooling on our test benches, but the CPU's cost is still a bit high compared to the competition. However, there may be a loophole to get you into a P4 system sooner than later. The new Northwood core is finding its way into 1.6GHz and 1.8GHz processors, in addition to the 2GHz and 2.2GHz parts. We have gotten our hands on the 1.6s (look for "1.6A" and "1.8A" to denote a Northwood core part) and 2.1GHz overclocks will certainly be within their grasp. Right now, a solid Athlon XP looks to be the winner on performance and pricing.

As for future AMD CPUs, which are codenamed "Thoroughbred," we're told we will see them this year; exactly when is still anyone's guess.

There you go—a heads up on what's coming down the pike. ■

Talk with Kyle at kyle@cpumag.com.

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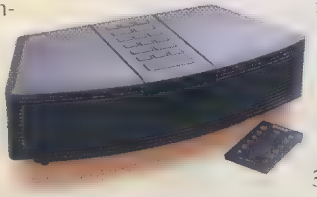

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Each month we ask a staff writer to take on our publication editor in a challenge to build the best PC for a certain price. Because our writers don't want to lose their jobs, they always accept this challenge willingly. Tempers will flare. Tools will fly. But only one will prevail.

This month the challenge is to build the
Best Budget Server for less than $1,000.

THE PC CH

Samit Choudhuri
Publication Editor
Computer Power Use

Samit

A few years ago some friends and I took our older PCs and set them up as servers for a startup venture. We did something similar for a second startup venture. Both times we encountered hardware problems that we needed to fix. This led to site downtime, which any tech entrepreneur will tell you is bad, bad, bad. We discovered that what works for hosting games and noncritical functions does not necessarily work well for a new company that needs a machine to host a startup e-biz Web site.

For this challenge, I want a Web/FTP server for a startup company that cannot afford downtime. That's how I defined my needs; this is not a file, e-mail, FTP, or print server. I had no interest in getting the latest and greatest untested hardware for mission critical situations. That firmly knocked out the Pentium 4 I originally had in my shopping cart. I decided on Dell instead of building yet another high-power system. Again, the main reason was service and support. I liked Dell's basic warranty (1 year onsite labor + 1 year parts delivery + 1 year technical support) and cheaper prices.

The Dell-made mobo features a ServerWorks ServerSet LE 3.0 Chipset, a Pentium III 1GHz CPU, 256MB ECC-SDRAM, and five PCI slots (three 32-bit/33MHz and two 64-bit/66MHz) with support for Universal cards; these two 64-bit PCI slots are for high-bandwidth RAID and network configurations that could come into play for Web servers. Also included are three spanned 20GB hard drives to provide some built-in redundancy, integrated ATI video, and management features (such as the "Watchdog timer," which detects if the OS is choking and reboots and restarts the server and services) too numerous to cover here.

I dropped into the local Circuit City for a cheap .27 dot-pitch 17-inch monitor and then popped over to Best Buy to buy a copy of SuSE Linux Professional 7.3 for a paltry $69. The SuSE installation was pretty straightforward. I started playing around with some of the bundled GUIs and settled with KDE. While browsing, I found a program called Comanche and used that to install and initialize the bundled Apache Web server.

One of many FTP packages included was ProFTPD (Professional FTP Daemon) and wu-ftpd (Wuarchive-ftpd); you could use both to set up FTP functionality. I also used the bundled LinNeighborhood (GUI Samba 2.2 client) to emulate Windows Network Neighborhood and to test file management and network compatibility between the Linux box and several Windows PCs.

I didn't want to build a machine for noncritical tasks. I vowed to not make the same mistake thrice by modding a PC into a server for mission-critical chores. It would have been easy to take an ordinary system (even December's Granny PC) and set it up for server functionality. (See "Sidekick-To-Insidious" System on opposite page.) My past experiences in startups have taught me not to send a client (Cal's mid-1990s back-of-the-fat-mag-of-yore-*Computer Shopper* white-box wannabe) to do a server's (Samit's PowerEdge 500SC) job.

Component	Model	Price*
Case	Dell PowerEdge 500SC	
Motherboard/ Processor Bundle	Dell motherboard/ Pentium III 1GHz	
Memory	256MB 133MHz ECC SDRAM	
Hard Drive	20GB IDE (3)	
Video Card	Integrated ATI-Rage XL (4MB)	
Sound Card	See Speaker entry below	
Network Card	Integrated Intel 10/100 PCI Fast Ethernet Adapter	
CD-ROM	48X IDE CD-ROM drive	
Diskette	3.5-inch 1.44MB floppy drive	
Monitor	17-inch ProView 730***	169.99**
Speakers	Oi! Who needs 'em on a server?	n/a
Mouse	Logitech System mouse	
Keyboard	Standard Windows keyboard	
Software	SuSE Linux 7.3 Professional****	69.99
Subtotal		$1,015.98
Rebate		- $80
Shipping	(after $35 shipping discount)	$0
Tax		$66.05
Total		$1,002.03

*PC components with no price listing were purchased together for $776 (before tax) at Dell.com

**Includes $80 rebate

***Purchased from Circuit City

****Purchased from Best Buy

LLENGE

S.

Cal Clinchard
Staff Writer
Computer Power User

Component	Model	Price*
Case	Antec SX630 Workstation mid-tower, 300W p/s	
Motherboard/ Processor Bundle	Intel D850MD 1.5GHz Pentium 4 PGA478 w/ 256KB L2 cache	
Memory	128MB Rambus (64MB RIMM x2)	
Hard Drive	Seagate ST320410A ATA1100 20GB	
Video Card	ATI Xpert Pro 2000 AGP 4X	
Sound Card	ADI 1885 AC'97 with SoundMAX	
Network Card	Intel PRO/100+ 10/100 NIC	
CD-ROM	Sony CDU5211-10/10 52X CD-ROM drive	
Diskette	Sony 1.44MB floppy drive	
Monitor	ViewSonic Optiquest Q41 14-inch CRT**	$159
Speakers	Midland Mli-699 14W speakers (pair)	
Mouse	Trekker Wheel Mouse 3.0A	
Keyboard	Key Tronic standard 104-key	
Software	Red Hat Linux 7.2, complete with Apache HTTP server	
Subtotal		$799
Shipping		$0
Tax		n/a
Total		$958

*PC components with no price listing were purchased together for $799 at LinuxMall.com

**Purchased from Monitor Outlet

Cal

Faced with the challenge of building a sub-$1,000 server, I embarked on the straight-and-narrow path of scouring the Web for parts. Foolish move. I quickly discovered that no mish-mash of piecemeal hardware was going to build a server that would successfully knock the Insidious One off his crooked pedestal. My rival is a tricky, tricky man, and I needed to concoct a server configuration that would upset him in a big way, a server that would cause dark clouds of victory to gather and rain blood on my vainglorious foe.

So I took a different tack and ventured into the land of built-to-order systems. I checked the PC Challenge rulebook for fine print and found no rule against building a PC online; in fact, there was no fine print. (Hmm, no wonder the Insidious One always wins.) I discovered a number of tempting online possibilities, but then I discovered some good deals at LinuxMall.com. I had decided at the get-go that my server would run Linux, and LinuxMall.com had just the ticket: A tasty special on a workstation/server in the Ebiz Terian family, equipped with a Pentium 4 1.5GHz processor and Red Hat Linux 7.2. It was time to get cookin'.

I decided to get the monitor purchase out of the way and see how many clams would remain for serious server buying. I went for the cheapest monitor I could find without looking pathetic: a ViewSonic-made Optiquest Q41, a 14-inch CRT with a 1,024 x 768 maximum resolution and a comfy 63Hz refresh rate (or 80Hz max at 800 x 600), for $159 and zero shipping and handling.

This left me with $841 to spare, but that was enough to purchase a first-class server. I thought the Intel D850MD Pentium 4 PGA478 motherboard with 256KB L2 cache was good enough to smoke (or at least match) its Samit-made counterpart. My only wish is that I'd had the cash to install 256MB of RAM, but it would've cost a little more than $200 more for two 128MB RIMMs than it cost for the 64MB pair.

I purchased a capable ATI Xpert Pro 2000 AGP 4X video card with 32MB of RAM, an adequate Seagate 20GB ATA hard drive, a Sony 52X CD-ROM drive, and an Intel PRO/100 10/100 NIC that's perfect for a budget server. This baby also has room to grow, with two 3.5-inch and two 5.25-inch bays available. Now we'll see if I can steal Samit's self-assigned moniker and become Cal "For The People" Clinchard. ▲

And The Winner Is . . .

Those of you waiting for an unseating of The Insidious One will have to wait another month. Despite Cal's valiant effort (and thoughtful chocolate bribe), Samit has done it again. Having been burned in the past by plain-PCs-turned-servers, Samit opted for the real thing this time. His Dell motherboard includes ECC (error correcting code) SDRAM, useful in a server because it checks the accuracy of the data as it passes through the memory. And while the 4MB of memory in the on-board video card may not seem like much, it's plenty for a server, which really only needs to display the OS on-screen. Especially impressive are the three 20GB hard drives and the SuSE Linux 7.3 Professional software Samit chose. I was amazed at the functionality this $70 gem offers. Cal also put together an impressive server. His Red Hat Linux choice is a smart move, even though it's not as complete as Samit's SuSE. The P4 is probably more power than this server needs, although servers will likely begin heading in that direction as servers decrease in price for the mainstream. Still, putting that money toward more hard drive space and memory would have been a good move. Cal's system would work just fine as a print or internal file server or as a server dedicated to developing and testing. But given the choice of which server I would want handling my important data, I think I'd have to go with Samit's heavy-duty Dell, even if it did cost a tad more than $1,000. *–Jennie "The Judge" Schlueter, content editor*

Swappin' Parts

There's A Transformation Taking Place

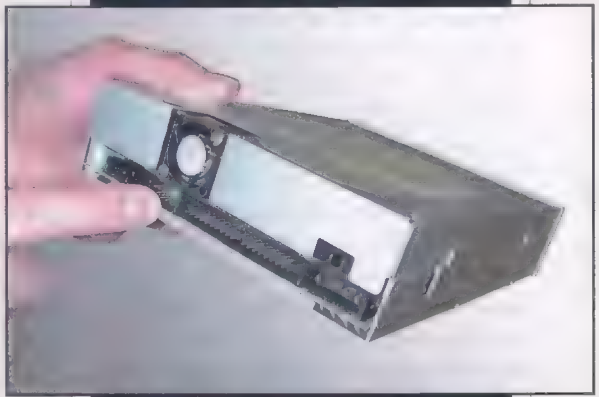
Each month in "Swappin' Parts," a Computer Power User *writer upgrades one out-of-date component in our test machine, MERLE (Mediocre Electronic Refurbished Low-end Equipment). When we're finished, we will have transformed MERLE from a silicon trash can into a powerful system we'd be proud to put in our own homes. To date, we've upgraded MERLE's CPU, sound card, speakers, memory, and video card.*

Our lovable MERLE is a caterpillar-in-waiting. A Sabrina on her way to culinary school. A digital ugly duckling ready to turn into a cyberswan.

OK, MERLE's really a frumpy little beige box with a handful of hot technologies inside. Already in his homely shell he's hiding a 1.4GHz Athlon and 512MB of PC133 SDRAM. A sleeker case is in his future, but for now, we're enjoying his stealth mode. He's not a Shelby Cobra with a 428 yet, but he's definitely the equivalent of the Super Stock Dodge that little old lady from Pasadena owned.

Last month, we fitted MERLE with an ATI Radeon 8500DV video card. Before that, we gave him a Creative Audigy Platinum sound card and Klipsch 4.1 speaker system. If he gets any louder, king of the surf guitar Dick Dale might start hanging out around here. This month we planned to put MERLE's new audiovisual accoutrements to good use with a DVD drive. And then, well . . . one thing led to another. Oops, we did it again.

The Pioneer DVR-A03 combo drive we stuck in MERLE comes with a DVD-R, CD-R, and everything shown here.



We set the new Pioneer drive as a master device, as MERLE may not have liked the cable select setting. Aren't these handy jumpers?

Once we screwed the side drive rails on correctly, the Pioneer drive slid right in.

O Pioneer!

Giving MERLE a regular DVD-ROM drive would have been an improvement over his current 8X CD-ROM drive, which we figure runs on steam power and was manufactured in late October 1843. This embarrassment of a CD-ROM drive had to go.

But was a DVD-ROM a bright idea? Sure, they're cheap enough, but all they really add at this point is a bit of read speed and the ability to play movies. And until we get a full-sized flat monitor that makes "The Rock" rock, we probably won't move MERLE next to the Barcalounger.

Adding a 24X or 32X CD-RW drive, or—if we had a few extra months to wait—a new 40X Benq CD-RW we've heard about would have been more practical. MERLE's 10GB hard drive is more like flared hiphuggers than baggy mallrat pants as far as roominess goes, so he would appreciate the ability to dump 700MB or so into cheap CD-Rs. Plus, MERLE's expressed a desire to burn a comprehensive set of discs containing everything Rick Astley has ever recorded. (We'd like to burn it too, just in a different way.)

It was getting tough to decide between DVD and CD-RW. On a lark, we suggested Pioneer's combo DVD-RW/CD-RW drive, the DVR-A03 ($499; also known as the DVR-103), to the *Computer Power User* powers that be. Astoundingly, they bought it. Not only can this remarkable drive play DVDs and burn CDs, it can write 4.7GB DVD-Rs and write or rewrite DVD-RWs (but not DVD-RAM). That's big-rump storage. Getting into numbers, the DVR-A03 is a 2X/1X/4X DVD-RW (write DVD-R/rewrite DVD-RW/read speeds) and an 8X/4X/24X CD-RW.

The DVR-A03 bundles the software we'll need: CyberLink PowerDVD 3.0 for movie playback, Veritas PrimoDVD

2.0 for burning discs, and Sonic Solutions MyDVD 2.3 for making our own home movie DVDs that a standalone DVD player can play. And yes, the Pioneer can handle all of our numerous CD-ROMs and audio CDs.

Our only concern was the whole rewriteable DVD format debate: Will DVD-RW or DVD+RW become the standard? We think more consumers may feel comfortable with these natively bare-disc formats than they did with the earlier, becartridged DVD-RAM format, although shoppers can buy DVD-RAM cartridges that let them remove the discs inside. Hopefully future drives will embrace all standards. In the meantime, a few Web searches revealed that it's easier to find blank DVD-RW and DVD-R media now than DVD+RW discs, so we bought the Pioneer.

MERLE's Makeover

This was actually one of our easier upgrades, as Windows Me has no problem using the DVR-A03 right out of the box. Although for the purpose of style, perhaps we should refer to the OS as "Windows Royal We." (A sprinkle of editorial humor there, gentle reader.)

We shut MERLE down and then removed his case. Next, we popped off his fascia with only a little bit of swearing. This was a good point at which to go to the sports bar across the street for a pint. Afterward, we donned our nerdy wrist strap and clipped its cable to MERLE's metallic hull. A cheap wrist strap safely discharged any static we might have generated so we wouldn't inadvertently give MERLE a digital lobotomy with a stray spark.

MERLE's 5.25-inch drive bays required us to attach metal drive rails to the left and right sides of each device. These rails fit channels in each of the drive bays so an optical drive or other device can slide snugly into place. Spring clips on the front of each rail click into the drive bay, retaining the device.

We swore a bit more at this point. We couldn't find any more drive rails, and we realized we had to cannibalize what we had. This meant we had to replace the existing 8X CD-ROM with the new Pioneer instead of keeping them both. We gently removed the old CD-ROM drive's power cable, data cable, and four-wire audio cable. Then we squeezed the CD-ROM drive's spring clips and pulled it out.

We unscrewed the drive rails from the CD-ROM. Next we used the new screws that came with the Pioneer drive to attach the rails to it. On the back of the Pioneer, we checked to make sure its plastic jumper was in the "master" position. This was the best setting, as the DVR-A03 would be the only device on the secondary EIDE cable. This let us avoid putting an optical drive on the same cable as the hard drive, which can slow a system down.

> A cheap wrist strap safely discharged any static we might have generated so we wouldn't inadvertently give MERLE a digital lobotomy with a stray spark.

We slid the DVR-A03 into MERLE's drive bay until the spring tabs clicked into place. We then connected the audio, EIDE, and power cables. We took care to get each connector facing the right way, and to seat them fully without bending any pins. Be sure to use the connector on the end of the cable if your drive is the master device, or the middle connector if it's a slave and another device is the master.

Finally, we turned MERLE on. He booted fine, and WinMe detected the DVR-A03 without any problems. We inserted the Pioneer installation CD, ran Maestro.exe, and installed the companion software mentioned earlier. MERLE was set.

After we locate a couple more drive rails, we'll probably put our sad, old CD-ROM back in MERLE as a slave device on the Pioneer DVR-A03's EIDE cable. MERLE has enough drive bays to house both drives, plus the Audigy Platinum's breakout box, so space isn't an issue. The extra drive will make copying CDs easier. Plus, if we want to save wear and tear on MERLE's expensive new combo drive, we can install apps and play audio CDs using the old 8X drive. As for games and other speed-sensitive programs, we'll install them from the new Pioneer drive and/or apply no-CD patches after installation.

Testing MERLE

As always, we benchmarked MERLE before and after our project. We didn't really expect his SYSmark2001 scores to change with this upgrade, and we were right. His Overall score stayed at 75, the result of an Internet Content Creation score of 82 and a slightly higher Office Productivity rating of 69. Don't read anything into the one-point Office Productivity fluctuation, though. We run three iterations of SYSmark2001 and average the results of the three, so there's plenty of room for slight variations.

The real test for this upgrade is the optical drive's speed. We used CD Tach 98 for our before-and-after comparison, in deference to our old CD-ROM drive. Surprisingly, the older drive had the edge with a 115ms random access time and a 204ms full-stroke time. The new Pioneer turned in 128ms and 311ms times for the same tests, which we'll forgive because the new drive is so much more useful.

In any case, it's much more important for an optical drive to have fast sequential rates because that's how the majority of its information is accessed or written, unlike a hard drive. In this arena, the new DVR-A03 won handily, with a 2,370KBps average read rate, a 2,651KBps maximum, and a 15.1X weighted average drive rating. The older drive had an 8X read speed rating across the entire range of the test CD (1,204KBps). Essentially, MERLE's overall speed wasn't affected by the new drive, although he will load apps from CD-ROM much more quickly than he used to.

Coming Soon

Our prayers have been answered. MERLE will emerge from his cocoon next month as a butterfly with a brand new case. Check back as we inflict further indignities upon his person. But don't worry, it's for his own good.

by Marty Sems

X-ray Vision: Capturing Digital Images

When it comes to digital photography, there's more than meets the eye. Although snapping a digital photo appears easy enough on the outside—press the shutter, and the photo appears on the LCD—what goes on inside the camera is an extremely complex process.

Why should you care about these inner workings? In addition to being able to hold up your end of a digital camera discussion, understanding the various processes used to create a digital image will be to your advantage when you purchase a digital camera.

1 When you push the shutter button on your digital camera, the lens opens and allows light to strike the light-sensitive CCD or CMOS silicon chips inside the camera. Each chip contains thousands or millions of photosensors. In most cameras, each photosensor collects red, green, or blue light only. In other, high-end cameras, a light splitter allows each photosensor to read the exact colors.

CCD Or CMOS?

Nearly all digital cameras use one of two types of silicon chips to capture light: CCD (charge-coupled device) or CMOS (complimentary metal-oxide semiconductor). Both work similarly: When the camera's lens opens, these chips measure the amount of light striking them to digitally represent the photo. This is similar to the function of traditional film.

Manufacturers design CCD chips for use in digital cameras. This gives CCD chips some advantages in capturing images over CMOS chips, which manufacturers make using means similar to other types of processing chips. Because of the manufacturing process, CCD chips usually do a better job of capturing light and representing images than do CMOS chips, especially in low light. CCD chips are also less susceptible to noise than CMOS chips. The chips generate heat inside the camera that can create noise that causes stray pixels in a digital photo or grainy photos. Because manufacturers have used CCD chips in digital cameras longer than they've used CMOS chips, CCD chips have enjoyed more advancements, allowing for greater resolutions.

However, CMOS chips do have a few minor advantages over their more established counterparts: Manufacturers usually can make CMOS chips for a lower price than CCD chips. CMOS chips do a much better job of conserving battery power than do CCD chips, as well. Both of these factors currently make CMOS chips more likely to appear only in a few low-end digital cameras.

The camera manufacturers we spoke with don't sell any CMOS cameras yet. If CMOS chips can achieve an image quality closer to CCD, though, manufacturers are sure to give the technology a second look. "CMOS is much newer, but it probably has really great potential," says Sally Smith Clemens, product manager at Olympus. "Once CMOS hits 2 megapixels or 3 megapixels, if and when that occurs, one would have to assume that the CMOS chip would be able to perform at a level similar to CCD."

More Than Megapixels

Even though most digital cameras currently contain CCD chips, not all CCD digital cameras offer the same image quality, as you may have discovered after buying a poor-quality camera. Many other factors can affect the image quality of a camera. And the factor you hear the most about, number of megapixels, isn't necessarily the most important one.

Creating photos with high image quality in a digital camera requires many of the same technologies in a film camera. Lenses and the camera's optics are key to creating high-quality images.

X3 Improves Image Quality

The newest revolution in digital photography and video is underway, thanks to Foveon's new X3 technology. Named for its ability to capture light in three colors (red, green, and blue) for each pixel, the Foveon X3 image sensor processes images in a fashion similar to conventional 35mm photography. Instead of separating images into different colors (which is what today's digital cameras do), the X3 employs three color layers to measure the penetration depth of light photons. The result is a precise measurement for each pixel, which makes for fewer pixels overall and smaller file sizes. Because X3-made pics can also be enlarged to 30 inches, their quality is actually superior to standard 35mm photographs.

CCD vs. CMOS

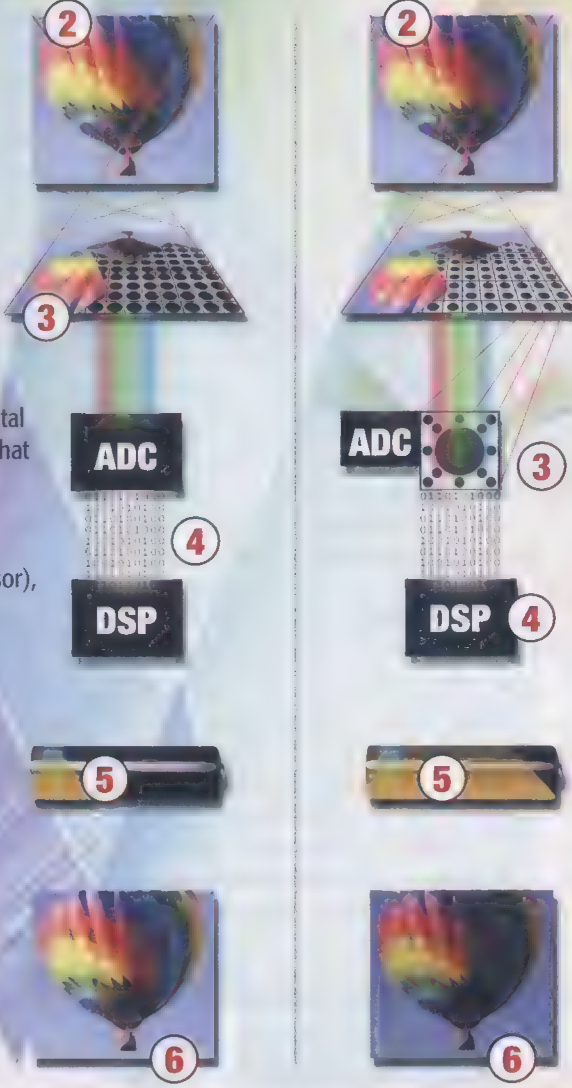
2 In a CCD camera, each photosensor converts the light measurement into an electrical charge. Photosensors in CCD cameras are larger and can absorb more light than CMOS chips. Brighter lights yield larger charges.

3 The charges pass to a special photosensor that collects the data and then to an ADC (analog-to-digital converter), where each charge becomes a digital value that represents the color of that tiny piece of the overall image.

4 The data then passes to the DSP (digital signal processor), where the camera enhances, compresses, and stores the image.

5 Because CCD cameras require more specialized procedures to process the light signals, they use more battery power than CMOS cameras.

6 Images created with CCD cameras, especially in low light, generally are brighter than CMOS camera images.



2 In a CMOS camera, each photosensor converts the light measurement into an electrical charge. Photosensors in CMOS cameras are smaller and absorb less light than CCD chips because CMOS chips contain additional circuitry and transistors for amplifying the electrical charge.

3 The additional transistors sometimes block light rays from reaching the photosensor, resulting in darker images. However, many CMOS chips handle the ADC within each photosensor, which preserves battery power.

4 The data then passes to the DSP (digital signal processor), where the camera enhances, compresses, and stores the image.

5 CMOS cameras can be 100 to 1,000 times as efficient as CCD cameras in terms of battery usage.

6 Manufacturers can't yet make CMOS cameras with as many photosensors as CCD cameras have, meaning CMOS camera images can be dark and grainy, especially in low light.

Mike Rubin, senior product manager at Nikon, rates the number of megapixels a digital camera can capture as the fourth most important factor in determining image quality, trailing lenses and optics, exposure settings, and image processing. "We like to call it garbage in, garbage out," Rubin says. He says you can think of the megapixel measurement in a digital camera like film in a traditional camera. Some types of film are sensitive, just as some digital cameras have resolutions of 6 megapixels or more. But if the lenses aren't sharp or the exposures aren't correct, the image quality will be poor.

"We've all gotten so hung up on the digital part of digital photography that we've forgotten about the photography," Rubin says. "If a lens can't create a sharp image, it doesn't matter if you have 5 megapixels, 10 megapixels, or 20 mega-pixels; a soft image is going to be a soft image."

Users concerned with image quality should do their homework and study several cameras. Read reviews, view test images, and look at a company's history with lenses and optics. Don't forget about megapixels, but don't base your purchase on them.

Finally, keep an eye on the CMOS-CCD battle. Right now it's not much to watch, but in a few years, especially in an industry where changes occur at light speed, who knows?

"When you jump into the higher-level cameras, I think you're still going to continue to see CCD technology for a while," Smith Clemens says. "Olympus only has CCD cameras right now. But I'll never say never. Enhancements in CMOS are occurring." CPU

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by Kyle Schurman

Wireless LANs

Settling On A Standard

If you're thinking about installing a wireless network, you'd better be into chaos and shackles because finding the best standard for your needs could take awhile. Several first- and second-generation standards are hoping to become the standard that ends the chaos.

A Primer

A wireless network is one in which the network nodes, or each device in the network, communicate via radio waves, which can penetrate walls and floors. Other devices on the network use receivers to "listen" for the radio waves and pull in the data. Some wireless networks may use a gateway or access point to boost the radio waves, manage the wireless traffic, or manage the network's Internet connection. The wireless network could connect a variety of devices, including PCs, music systems, TVs, and home security systems.

A wireless network works like a traditional network without the cabling. In fact, the same networking protocols usually apply to both wireless and wired networks. However, wireless networks have two distinct advantages over traditional networks: You don't have to string cables to remote locations in your home, and your network devices can be mobile, yet remain connected to the network.

Wireless networks also have two distinct disadvantages. Many current wireless networks are vulnerable to security problems. Much of the recent publicity for WLANs focuses on several discovered security vulnerabilities. Developers are working on new security standards. Beyond security questions, a wireless network has at least one other disadvantage compared to a wired network: lack of a single industry standard.

Developing A Standard

Although most wireless networks work in a similar manner, each one has its own idiosyncrasies. In the early days of wireless networking, these differences were significant enough that hardware from different manufacturers wouldn't work together. Those in the industry then began working together to develop standards that would let manufacturers design hardware according to an industry standard.

This task proved more difficult than expected and resulted in the various standards that exist now. Many of these standards base themselves on the IEEE 802.11 specification, which is a wireless Ethernet specification finalized in June 1997.

Wi-Fi/802.11b

WECA (Wireless Ethernet Compatibility Alliance) created the Wi-Fi (short for wireless fidelity) logo. Products that conform to the Wi-Fi specs will work under the 802.11b wireless networking standard and can display the Wi-Fi logo. While Wi-Fi and 802.11b aren't exactly the same, most people use the terms interchangeably.

The 802.11 specification we discussed earlier has splintered into different standards, and Wi-Fi follows one of them: the 802.11b standard. The IEEE approved 802.11b in 1999. The 802.11b standard, and a few others we'll discuss later, grew out of the IEEE's creation of several specialty groups soon after approval of the 802.11 standard. Each specialty group was given the task of improving the original standard following a few specific guidelines.

If you forced experts to pick the current dominant wireless standard, Wi-Fi would receive the majority of the votes. Wi-Fi received a couple of boosts in 2001 when Microsoft announced its Windows XP operating system would include support for Wi-Fi and when Intel abandoned its support for HomeRF and began making products for Wi-Fi. As Wi-Fi has matured, it has grown from being a standard aimed at businesses to being a standard useful for home users, too. Wi-Fi is licensed for use in North America, Europe, and Asia.

802.11b and the other 802.11 standards use DSSS (Direct Sequence Spread Spectrum, sometimes shortened to DS) technology to send data. Because 802.11b operates in the 2.4GHz spectrum, interference from other devices can be common. Microwave ovens, cordless phones, and other devices operate in this crowded spectrum, which extends from the 2.4GHz to 2.4835GHz range. By using DSSS, the 802.11b standard tries to minimize interference by using the full spectrum range to send data.

DSSS splits each byte of data into several parts and then sends each part on a different frequency channel at the same time. By moving the data throughout the spectrum, only a small portion of the data is subject to interference from a particular device.

Wi-Fi networks can send data at 11Mbps under ideal conditions, with little or no interference. When interference occurs or when signal strength wanes, the network speed automatically drops to 5.5Mbps, then 2Mbps, and then 1Mbps. While dropping the network's speed isn't desirable, this process does keep the network connections reliable.

Wi-Fi has a few other advantages. It can operate over longer distances (around 1,000 feet in open areas and 250 to 400 feet in closed areas), it works well with existing wired networks, and its hardware is compatible with most 802.11 DSSS devices.

802.11a

It seems as though the 802.11b/Wi-Fi standard has only begun to realize its potential, and already industry analysts are planning the next generation of WLAN technologies and standards, with an eye on improved transmission speeds. Some analysts say this may further splinter the market, just at a time when it appears Wi-Fi is offering consumers a stable standard.

"Especially for the home users, everyone's worried about simplicity . . . and you don't want to throw a lot of standards in people's faces," says Gemma Paulo, an analyst with Cahners In-Stat Group. "On the other hand, companies need a lot of bandwidth."

One of the standards competing to be part of the next generation of WLAN technology is 802.11a (or Wi-Fi5), which offers some similarities to 802.11b/Wi-Fi. Both focus on defining the lower network layers, each of which provides a specific functionality to the network.

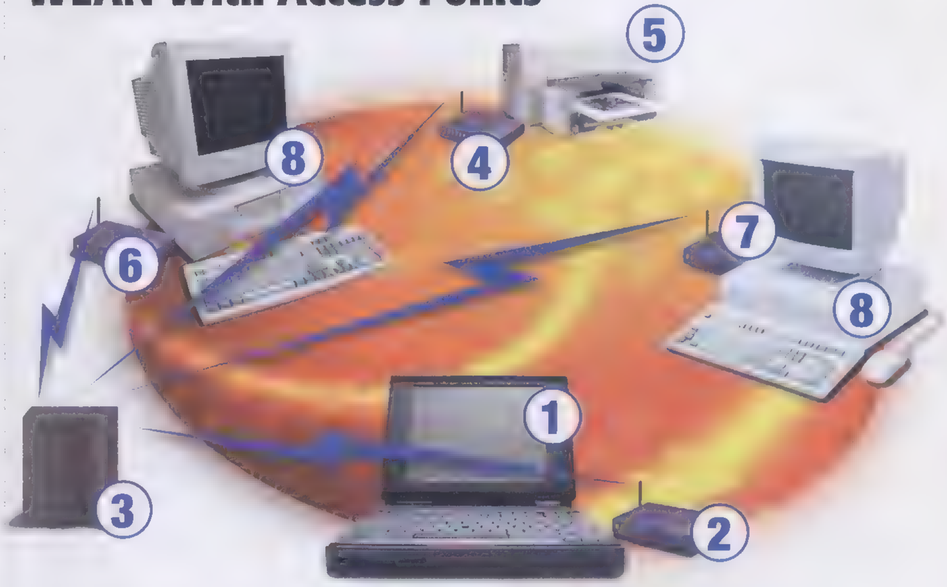
802.11a and 802.11b each use the same MAC (Medium Access Control) layer, which determines how each node in the network communicates with the other nodes. The MAC layer follows the CSMA /CA protocol, which is found in Ethernet networks and ensures that only one node at a time is sending communications, thereby avoiding data collisions. 802.11a and 802.11b use different physical layers, though. The physical layer (sometimes called the PHY layer) determines how the data should be encoded before it is sent.

802.11a, which is licensed for use in North America only, operates in the 5GHz spectrum. Specifically, 802.11a works within the 5.15GHz and 5.35GHz range and the 5.725GHz and the 5.825GHz range, which totals a large 300MHz slice of frequency space. The 802.11a standard does not have many worries about frequency interference because very few devices currently operate in the 5GHz spectrum. Those developing the 802.11a standard have planned for potential growth in usage of the spectrum by other devices, though.

By using OFDM (Orthogonal Frequency Division Multiplexing) as the modulation scheme, 802.11a divides the available frequency into eight channels and 52 subchannels. Each device on the 802.11a network then should be able to find an open channel on which to transmit. Once one device on the network is using a particular channel, the other devices can't use it. Four of the subchannels within each channel carry error correction code; the other subchannels carry data.

The 802.11a standard offers one huge advantage over 802.11b: speed.

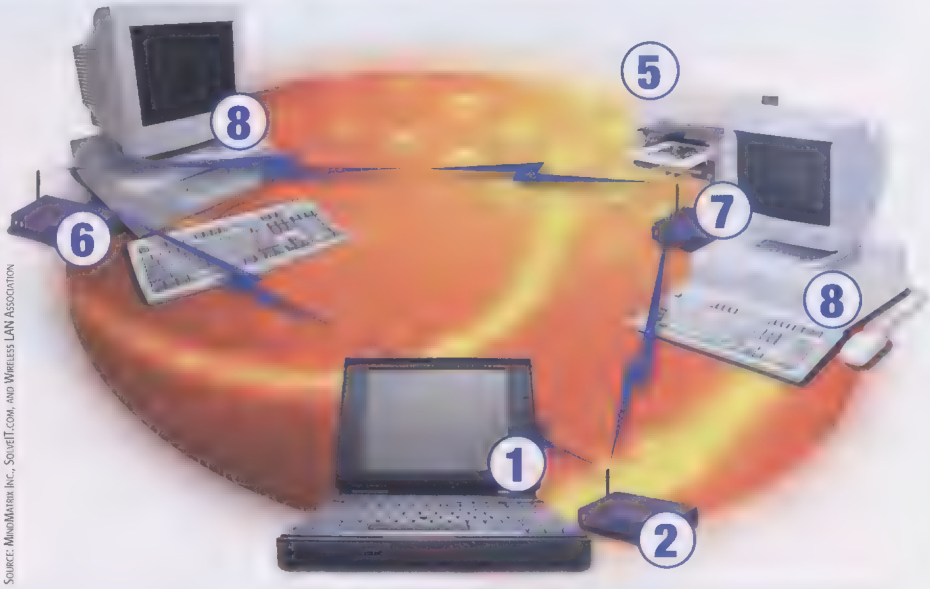
WLAN With Access Points



In a WLAN that uses access points (3), users gain access to the WLAN through the access point hardware. Most businesses will place several pieces of access-point hardware throughout their building, giving users continuous access to the WLAN. With a WLAN using access points, user hardware devices don't communicate directly with each other; instead, they communicate with each other through the access point. If you need to connect multiple WLANs, you can use a piece of hardware called a specialized bridge (4) to make connections between far-flung access points.

With a WLAN that doesn't use access points, devices communicate directly with each other, as in a peer-to-peer network. Most notebook computers (1) will need a WLAN adapter on a PC Card (2) to connect to the access point or to other devices on the network. For desktop computers (8) and printers (5), WLAN adapters are available in both external pieces of hardware (6) and PCI/ISA expansion cards (7) for both access point WLANs and non-access point WLANs.

WLAN Without Access Points



Source: MindMatrix Inc., SolveIT.com, and Wireless LAN Association

Developers say a wireless network running 802.11a could offer transmission speeds up to 54Mbps under ideal conditions. Because it operates in a higher frequency, 802.11a signals are limited to around 50 to 75 feet, meaning users will need additional access-point hardware to provide adequate service.

To further complicate matters, 802.11a won't appear in Europe, where 802.11h will emerge. Some experts think 802.11h will eventually offer more features than 802.11a and become a replacement for it in North America. Plus, companies wanting to sell WLANs into the home are working on 802.11e. This is not so much a new protocol as a technology that will improve upon existing 802.11 protocols.

802.11g

While 802.11a has the backing of several tech companies, others are focusing their support behind 802.11g as the next-generation WLAN standard.

802.11a is slightly ahead of 802.11g in development, but those supporting 802.11g say it's the logical choice for the future of WLAN because it's backward-compatible with 802.11b. Both 802.11g and 802.11b operate in the 2.4GHz frequency spectrum. 802.11a isn't compatible with 802.11b, but some industry experts hope that still-in-development technology will let the two standards communicate.

Development of 802.11g has been a little slow, thanks in part to a reported disagreement over the direction of the standard among the supporters of 802.11g. The final version of 802.11g is expected to support transmission speeds up to 54Mbps, but the rift between the standard's supporters caused the IEEE and its Task Group G to nearly scrap plans for 802.11g.

The debate centered on differing technologies from Intersil and Texas Instruments. Intersil's plan uses OFDM as the modulation scheme. TI developed the PBCC (Packet Binary Convolution Coding) modulation scheme. Both technologies included support for backward compatibility with 802.11b. A slight majority of members of Task Group G favored OFDM, but the technology requires 75% approval for passage as the standard. For most of 2001, Intersil didn't have enough votes for passage. Hopes for finding a compromise appeared bleak because the two technologies couldn't be meshed easily, and the task group considered scrapping the entire standard. However, task group members decided to back OFDM late in 2001. Intersil introduced the first 802.11g chip set in January 2002. 802.11g remains in the draft stage at the time of this writing, though.

However, TI started offering products that incorporated PBCC in June 2001, angering some 802.11g supporters who say the introduction of other types of products will confuse end users. TI argues that the PBCC products serve as a speed upgrade for already existing 802.11b products.

HiperLAN2

HiperLAN2 is a second-generation WLAN standard that the ETSI (European Telecommunications Standards Institute) created in February 2000. HiperLAN2 operates in the 5GHz spectrum and uses OFDM technology, as does 802.11a. HiperLAN2 should operate at data transmission speeds similar to 802.11a, as well, around 54Mbps. HiperLAN2 should have an operational distance of about 400 feet.

HomeRF

HomeRF is actually an alliance between several companies who formed the SWAP (Shared Wireless Access Protocol) standard. However, the alliance now calls it the HomeRF standard; SWAP is no longer used. HomeRF consists of a combination of voice and wireless networking standards. The voice channels in the HomeRF standard use the DECT (Digital Enhanced Cordless Telecommunications) standard. For data transmissions, HomeRF uses the original form of the 802.11 standard.

HomeRF developers say the additional support for voice channels allows their standard to provide improved telephone usage in the wireless network. HomeRF's transmission speeds of between 1Mbps and 2Mbps are a little slower than some of the competing technologies. Its transmission range of about 100 feet is a little low, too. The HomeRF 2.0 standard, which is backward-compatible with the original

Choosing Sides

If you think the wide variety of choices in wireless networking standards is confusing, try being a corporation that's investing large amounts of money in the technology. Which technology should a corporation support? Although some companies are solidly behind one technology, others are hedging their bets with support for multiple WLAN standards.

802.11b or Wi-Fi

Fast Fact: Most widely used first-generation WLAN standard
Operational Radio Frequency: 2.4GHz
Top Speed: 11Mbps
Sponsoring Organization: Wireless Ethernet Compatibility Alliance (www.wi-fi.org)
Selected Member Companies: 3Com, Actiontec, AMD, Apple, Atheros, Cisco, Ericsson, Hewlett-Packard, IBM, Intel, Microsoft, Motorola, NEC, Philips, Proxim, Sharp

802.11a or Wi-Fi5

Fast Fact: It's one of several second-generation WLAN standards
Operational Radio Frequency: 5GHz
Top Speed: 54Mbps
Sponsoring Organization: Wireless Ethernet Compatibility Alliance (www.wi-fi.org)
Selected Member Companies: Some early manufacturers of Wi-Fi5 products are Intel, Atheros, Proxim, and Actiontec

802.11g

Fast Fact: It's one of several second-generation WLAN standards; not finalized at time of this writing
Operational Radio Frequency: 2.4GHz
Top Speed: 54Mbps
Sponsoring Organization: None yet
Selected Member Companies: The 802.11g standard is still awaiting final ratification. Intersil is the driving force behind the standard and announced a chipset supporting 802.11g in late January 2002.

HomeRF standard, increased its top speed to 10Mbps, but some companies have, at least initially, decided against using HomeRF 2.0 because of a lack of choices in available products.

HomeRF's future appears a little shaky at this point. Cahners In-Stat Group estimates HomeRF's market share of wireless networks in the home has dipped from 45% in 2000 to 30% in 2001, with Wi-Fi holding the other 70% of the market share in 2001. However, some third-party vendors may build support for multiple WLAN standards, including both Wi-Fi and HomeRF, into their future products, which some analysts think improves the outlook for HomeRF.

Bluetooth

A few years ago, Bluetooth looked to be the future of wireless networking. Now the standard is looking like a niche technology in the crowded wireless networking field.

Bluetooth operates in the 2.4GHz frequency spectrum, as does 802.11b. However, Bluetooth uses a different technology, called FHSS (Frequency Hopping Spread Spectrum, sometimes shortened to FH), to avoid interference. Using FHSS, data moves quickly between frequency channels within the overall range at an extremely fast pace (about 1,600 hops per second). The devices in a Bluetooth network send a burst of data on one channel and then switch to another channel. FHSS lets several networks use the same frequency range at the same time.

Bluetooth generated plenty of excitement a few years ago at its introduction. But its limited range of about 100 feet and its slower transmission speeds of about 1Mbps have let other standards soar past Bluetooth in the race for publicity. Bluetooth supporters have also had difficulty convincing developers to write programs to take advantage of the standard. Bluetooth has enjoyed some recent gains, though, including inclusion in one model of Compaq iPAQ handhelds.

Experts now see Bluetooth filling a niche market for PANs. Bluetooth could serve as the standard letting you manage all your personal electronics. It might also let your PDA automatically sync with your desktop computer whenever you walk within a certain distance of the desktop without taking the PDA out of your pocket. The chances Bluetooth will be used to connect computers and peripherals seem to be waning, though.

IrDA

Infrared is used in the IrDA (Infrared Direct Access) standard, the third type of technology used to send data on a wireless network, along with DSSS and FHSS.

An infrared light signal is like the one in your TV's remote. But IrDA isn't an ideal technology for sending data over a wireless network. Infrared light requires a line of sight, so it would be almost impossible to have an infrared network in a home; floors and walls would hamper the network.

From This Angle, It Looks Like . . .

While the availability of many wireless networking standards seems like a hopeless mess, it could be helpful in the long run. Strong competition means users should end up with a strong standard. Experts think the competing standards may spark manufacturers to create products that support multiple standards, too.

For those looking to leap to wireless now, that long-term viewpoint doesn't seem so attractive. Most of us would like to see one or two standards separate themselves from the wireless networking pack, and soon. In this race, you don't want to be caught backing the third- or fourth-place finisher.

If you think wireless networking is in your future, patience is a requirement, not just a virtue: It might take a few months or longer for the competing standards to sort themselves out. In the mean time, keep your ear to the air, listening for the wireless networking standard that carries the winning frequency.

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by Kyle Schurman

For more on WLANs, see www.smartcomputing.com/cpumag/apr02/wlan.

HiperLAN2

Fast Fact: It's one of several second-generation WLAN standards; most well known in Europe
Operational Radio Frequency: 5GHz
Top Speed: 54Mbps
Sponsoring Organization: HiperLAN2 Global Forum (www.hiperlan2.com)
Selected Member Companies: Atheros, Canon, Ericsson, LSI Logic, Motorola, NEC, Philips, Sharp

HomeRF

Fast Fact: It's a first-generation WLAN standard; rapidly losing market share to Wi-Fi
Operational Radio Frequency: 2.4GHz
Top Speed: 10Mbps
Sponsoring Organization: Home RF Working Group (www.homerf.org)
Selected Member Companies: 3Com, AT&T, Intel, LSI Logic, Motorola, Proxim, Xilinx

Bluetooth

Fast Fact: It's a wireless networking standard designed for the niche market of PANs (personal area networks)
Operational Radio Frequency: 2.4GHz
Top Speed: 1Mbps
Sponsoring Organization: Bluetooth Special Interest Group (www.bluetooth.org)
Selected Member Companies: 3Com, Agilent, Canon, Ericsson, Hewlett-Packard, IBM, Intel, Microsoft, Motorola, Sharp

IrDA

Fast Fact: Infrared represents some of the oldest wireless networking technology; based on infrared light signals; formed in 1993; requires line of sight; works well over short distances
Operational Radio Frequency: N/A
Top Speed: 4Mbps
Sponsoring Organization: Infrared Data Association (www.irda.org)
Selected Member Companies: Agilent, Ericsson, Hewlett-Packard, Microsoft, Motorola, Philips, Sharp Electronic, Zilog

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Systems from Alienware, Falcon Northwest, and Voodoo Computers are the Formula 1 cars and cigarette boats of the PC world. They're the fastest and the most powerful, the best consumer PCs money can buy. RAID hard drive configurations, the latest video cards, the fastest processors, 22-inch monitors, and 500-watt speaker systems are practically standard equipment on these machines. Welcome to the rarified air of the dream PC.

We asked each of the three companies mentioned above to send us one of their very best systems so we could check them out first-hand. We told the companies that they could configure the systems however they liked, with no cost restrictions. Our only requirement was that the companies used parts that they made available to their customers. As expected, each PC was hotter than donut grease; these hot rods would blast a painful hole in our budget.

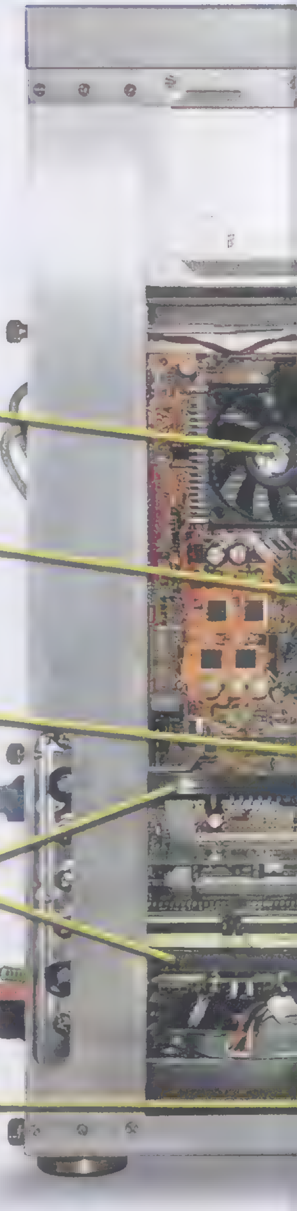
We really enjoy our jobs on days like these. We had to (*had* to, mind you) sit in front of three of the best PCs money can buy and take them for a test drive. You know what that means: hours and hours of playing Quake III, Serious Sam, Medal Of Honor: Allied Assault, and Return To Castle Wolfenstein. We know it's not the same as being here, but we've done our best to share the thrill of these stunning specimens with you on these pages. So strap yourself down, hide your credit cards, and take a closer look at these babies.

Falcon Northwest

Falcon Northwest has been putting speedy systems on hard-core users' desktops since 1991. Not surprisingly, most of Falcon's customers are serious gamers, including a 76-year-old lady who likes to play Everquest online with her grandson, according to Kelt Reeves, president of Falcon Northwest. The company runs a three-day burn-in period for each system, and each system must also pass

Fa

The all-aluminum Cooler Master ATC-110 case is lightweight and looks stunning. It has a front panel to hide the drive bays.



The AMD Athlon XP 2000+ processor with large heat sink and Cooler Master fan ensure that this CPU won't melt down.

Even the motherboard chipset has its own fan.

The GeForce3 Ti 500 video card burns through games at top speed.

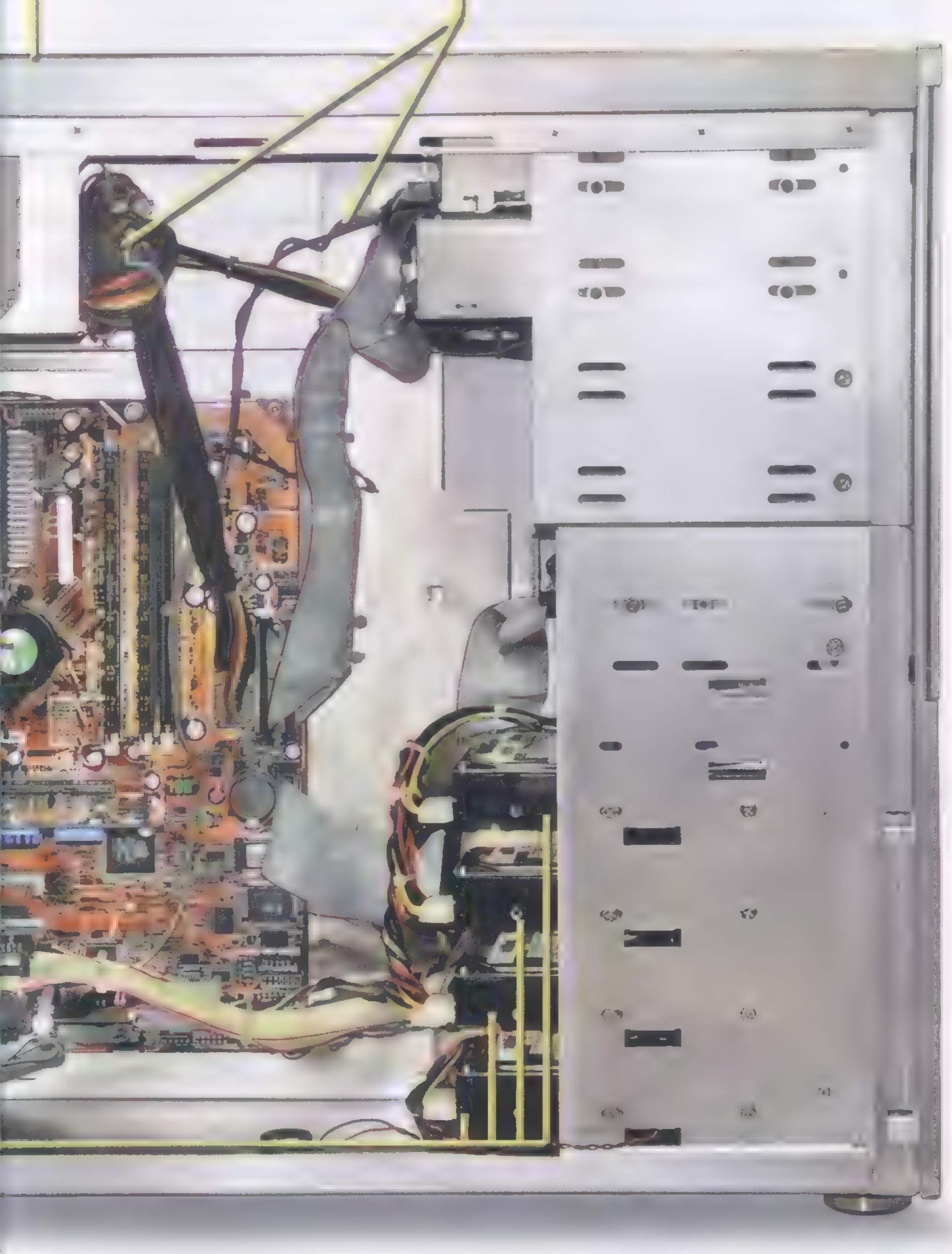
The CARDKEEPER devices lock AGP and PCI cards into place.

Four hard drives set up in a RAID configuration offer fast hard drive performance.

lcon Northwest

The Falcon Northwest system has three cooling fans: one on top, one in front, and one in back to keep air moving through the PC.

Power supply cables and ribbon cables are wrapped up and clipped to keep them out of the way, improving airflow inside the case.



more than 200 quality checks before it goes out the door.

Specifications. The system Falcon sent us costs $3,995. It's loaded with cool hardware, such as the Cooler Master ATC-110 brushed aluminum case. Not only is the case gorgeous, it's functional because it keeps the system's temperature down by drawing heat away from internal components. The system has four (yes, four) 40GB hard drives hooked up to a Promise ATA/100 RAID controller. It also has an AMD Athlon XP 2000+ processor, a hefty 1GB of DDR-SDRAM, and a VisionTek Ti500 video card. Falcon Northwest shipped a huge 21-inch Sony G520 monitor with this system. Like the other PCs we received, the Falcon Northwest uses a Creative Labs Audigy sound card and Klipsch ProMedia 5.1 speakers.

Performance. The Falcon Northwest system sliced through the SYSmark2001 and 3DMark2001 benchmarks we threw at it. The Overall score was 192, with an Office Productivity score of 186 and an Internet Content Creation score of 198. The Falcon's 3DMark2001 Overall score was 8,564, which is just plain scary.

We ran the Quake III benchmarks next. The Falcon system posted a silky smooth frame rate of 209fps at a resolution of 800 x 600 during the Demo1 test. We increased the resolution to 1,600 x 1,200 and clocked the frame rate at 129.3fps, which is still pretty speedy. The Falcon system cruised through the Quake III Crusher demo, as well, with a frame rate of 124.7fps at 800 x 600 and 102.3 at 1,600 x 1,200.

Finally, we ran the Serious Sam demos. The Falcon's average frame rate in the first demo, Metropolis Coop, was 77.3fps. The frame rate during the Memphis Suburbs demo was 79.9, which is practically equal to the frame rate posted by the Alienware system. If you want PC horsepower, this system has it with plenty to spare.

Falcon Northwest

Alienware

Alienware caters mostly to gamers, but DVD enthusiasts, IT professionals, and of course, those who simply love and appreciate powerful PCs also use Alienware's systems. Not all of the company's systems end up on a home user's desk, however. Alienware's customers include Blizzard Entertainment, the U. S. Army, and NASA, according to Kevin Wasielewski, marketing and business development manager for Alienware.

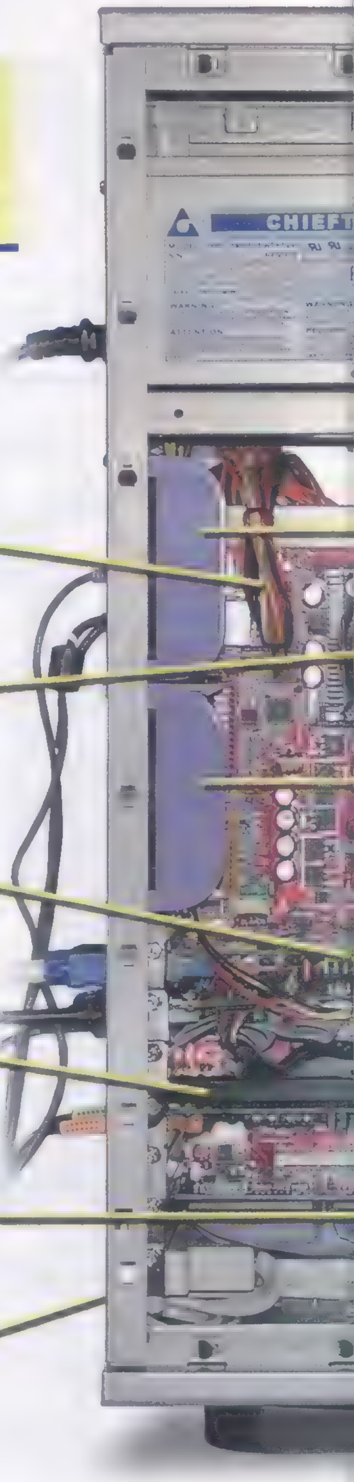
How does Alienware decide which hardware it will offer to its consumers? In the words of Wasielewski, "Research, research, research, testing, testing, testing, testing, testing, testing." Each system undergoes a 72-hour "burn-in" period and must pass a 200-point inspection before Alienware ships the PC.

Specifications. The PC Alienware sent to us is the least expensive model we received, at a mere $3,699. As you can see, it has a gorgeous silver case and matching 22-inch NEC FE1250+ monitor. Under this striking hood is an AMD Athlon XP 2000+ processor and 1GB of DDR-SDRAM. The Alienware system has a pair of 120GB hard drives, which is enough room to store about three Grand Canyons' worth of Bazooka bubble gum wrapper jokes, or something like that. The hard drives are connected to a Promise FastTrack RAID controller, which gives this system an additional performance boost.

The Alienware system's multimedia components are outstanding, as well. A GeForce3 Ti 500 video card powers the system's graphics, and an Audigy Platinum EX sound card, the latest from Creative Labs, makes this PC really sing. We've believed for a long time that the PC speakers from Klipsch are the best available, and apparently Alienware, Falcon Northwest, and Voodoo agree, because each company included a set of Klipsch ProMedia 5.1 speakers

Alienwar

The shiny, silver case has a front panel to hide the drive bays.



All internal cables are wrapped up and tucked away, some behind the PC's motherboard. This improves airflow inside the case.

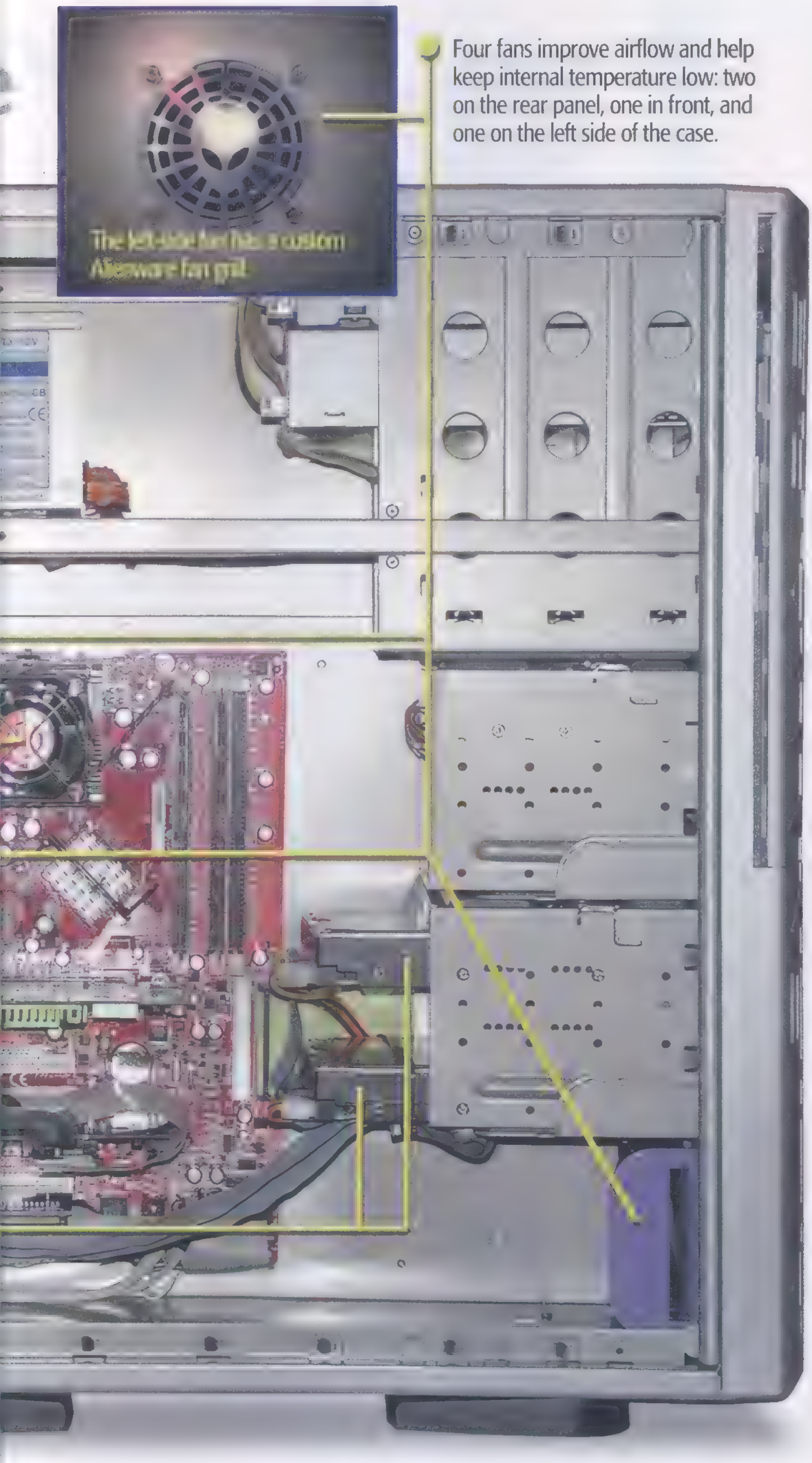
The AMD Athlon XP 2000+ processor is topped off with a large heat sink and cooling fan to prevent overheating.

This GeForce3 Ti 500 was the fastest available video card at the time Alienware sent us the system.

The CARDKEEPER device secures AGP or PCI cards firmly in their slots, vital if you take your system to LAN parties.

Two hard drives combined into a RAID configuration improve PC performance.

Two additional USB ports are accessible through the rear panel.



Four fans improve airflow and help keep internal temperature low: two on the rear panel, one in front, and one on the left side of the case.

with their systems. That's 500 watts of audio power for those of you keeping score at home. Alienware also chipped in a nylon carrying bag so we could tote the system to our next LAN party, along with a Plantronics speech recognition headset, a Logitech optical mouse, and a Logitech wireless keyboard.

Performance. We benchmarked each system using SYSmark2001, 3DMark2001, Quake III, and Serious Sam. All the PCs scored high in every test, as we expected, but the Alienware system did especially well. It produced an overall SYSmark2001 score of 206, with an Office Productivity score of 210 and an Internet Content Creation score of 202. In comparison, an "off-the-rack" PC between $1,500 and $2,000 usually scores between 150 and 170 in the SYSmark2001 tests. The Alienware system also fried our 3DMark2001 benchmark, with an overall score of 8,438. The Alienware's GeForce3 Ti500 video card gave this benchmark a swift kick in the pants.

We ran the Demo1 Quake III benchmark next. At the modest resolution of 800 x 600, the Alienware system ran at 227.1fps, which is the fastest frame rate we've ever seen running this demo. At 1,600 x 1,200, the system scored a blistering frame rate of 131.5fps. We ran the Crusher demo next, and the game's frame rate at 800 x 600 was 130.4fps. At 1,600 x 1,200, the frame rate was 101.5fps, which we thought was pretty impressive.

We ran two demos from Serious Sam (Metropolis Coop and Memphis Suburbs) and measured the frame rates for each, with the game's resolution set to 1,600 x 1,200 and with the 32-bit setting. The Alienware posted the fastest frame rates in Serious Sam, with an average frame rate of 81.0fps during the Metropolis Coop demo and a frame rate of 80.0 during the Memphis Suburbs demo. Did we mention that the game looked gorgeous?

Voodoo Computers

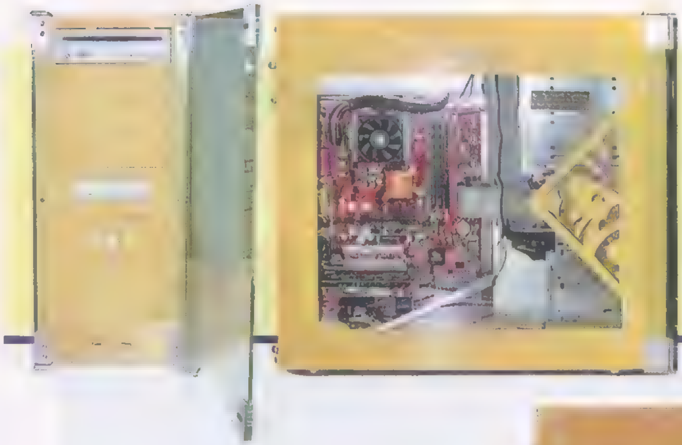
Voodoo Computers is the granddaddy among the companies that sent us systems for this article, opening its doors in 1991, just a few months before Falcon Northwest. As with the other companies, power-hungry gamers are Voodoo's main customers, although Voodoo makes systems for graphic design, CAD, music production, video editing, and scientific research, according to Rahul Sood, president of Voodoo Computers. Like Alienware and Falcon Northwest, Voodoo Computers makes each system it builds undergo extensive quality controls before it's shipped, including a long burn-in period. Sood says that master craftspeople from the company's hardware and software "guilds" also inspect each system before it's sent out.

Specifications. The Voodoo system we received isn't just about power; it's also about aesthetics. Voodoo Computers gave our PC's case a Lamborghini yellow paint job. (Black, blue pearl, and Ferrari red are other options.) The PC we received also had a window built into the side of the case and a neon light that gave the inside of the case a spacey glow. This light (and the components it illuminated) drew several *CPU* staffers to it like flies to a bug zapper.

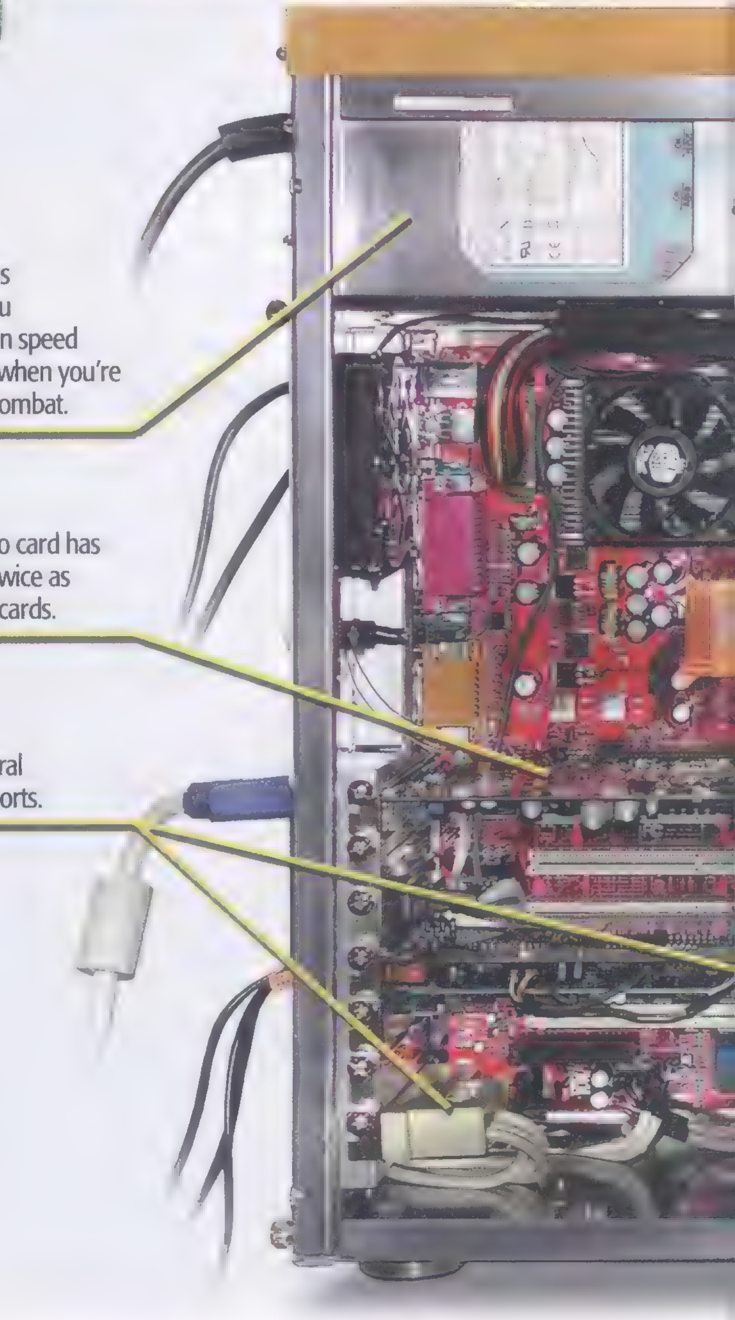
The Voodoo PC we looked at is an F-series EGAD gaming machine, which retails for about $4,800. It has an ultra-cool Cooler Master ATC-210 case with the aforementioned customized paint, window, and lighting effects. Voodoo Computers included a small brass plaque inside the case that reads:

Limited Edition Voodoo F-Class Computer System Designed And Handcrafted With Loving Care For Computer Power User Magazine Of Lincoln, Nebraska.

Now that's just sweet. And the rest of the metal inside this case is pretty sweet too, such as the AMD Athlon XP 2000+ CPU that powers this PC. The Voodoo system has 512MB of DDR-SDRAM



The Cooler Master ATC-210 case is hard to beat. It's Lamborghini yellow with a window and internal lighting effects. The drive bays are hidden behind an acrylic front panel.



The power supply has "volume control." You can turn down the fan speed (and thus the noise) when you're not in heavy virtual combat.

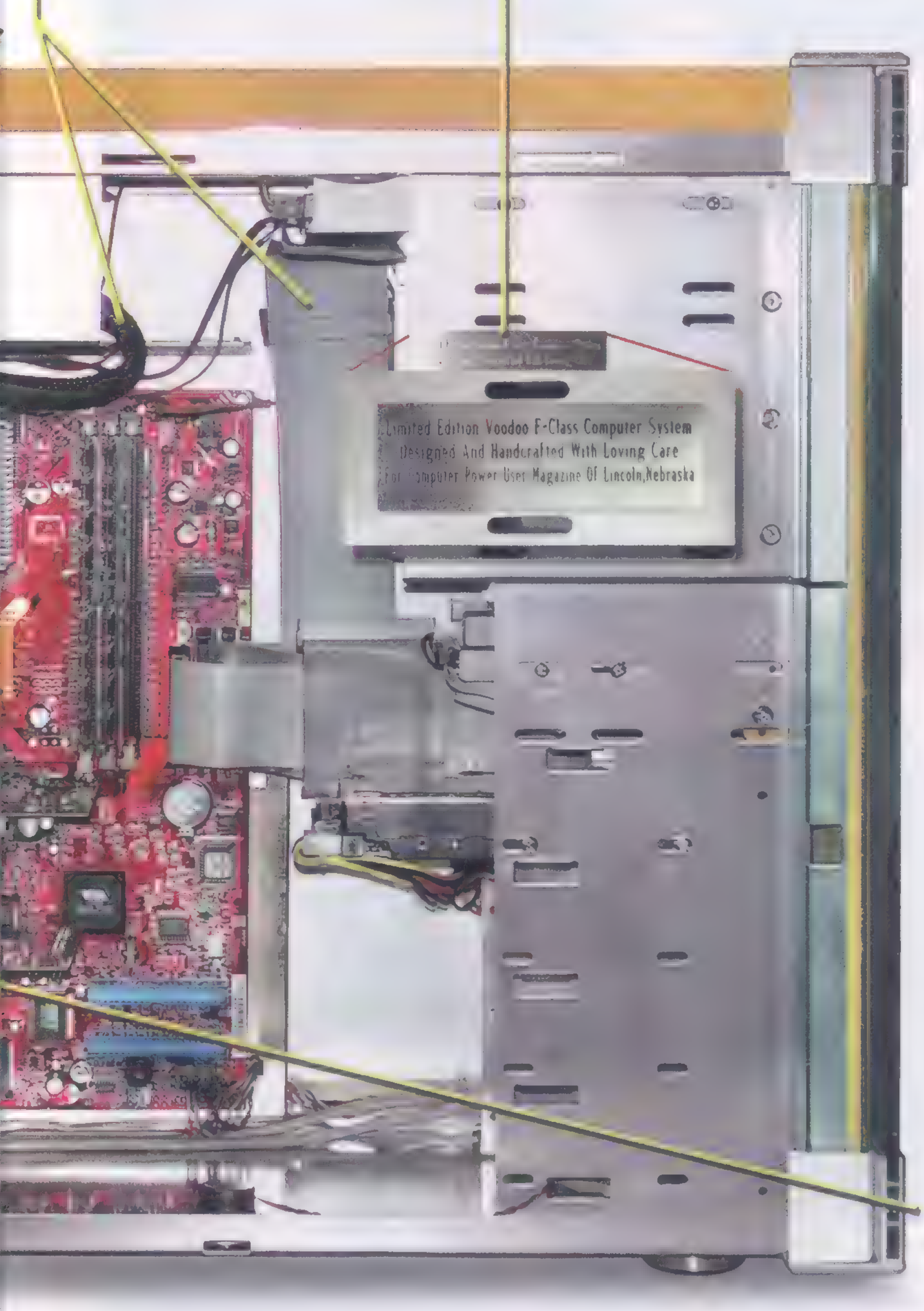
This ATI Radeon video card has 128MB of memory, twice as much as most video cards.

This system has several front and rear USB ports.

Voodoo Computers

As with the other systems, the Voodoo's internal cables are neatly tucked away to improve airflow.

The plaque is simply touching. We need a tissue.


Limited Edition Voodoo F-Class Computer System
Designed And Handcrafted With Loving Care
For Computer Power User Magazine Of Lincoln,Nebraska

rather than 1GB, which is a bit less than the other PCs. On the other hand, the Voodoo PC's Enermax fan system has a "volume control," which is pretty handy. You can adjust the speed of the fan to reduce the amount of noise the fan makes and crank up the fan when you're making your PC work overtime. The system includes a gorgeous, black, 22-inch NEC FE1250+ monitor, but rather than use an NVIDIA video card, Voodoo installed a Radeon 8500 video card with 128MB of RAM. Voodoo also included a Creative Labs Audigy sound card and a set of Klipsch ProMedia 5.1 speakers.

Performance. The Voodoo system raced through the benchmarks about as well as the Alienware and Falcon Northwest systems. The Voodoo PC's Overall SYSmark2001 score was 193, with an Office Productivity score of 194 and an Internet Content Creation score of 193. These scores, though not quite as high as those of the Alienware and Falcon Northwest systems, are still beyond the reach of a mere mortal PC. The system's 3DMark2001 score of 8,427 was also impressive.

The Voodoo PC's Quake III and Serious Sam frame rates were solid, although they were a bit behind the other two systems. ATI Radeon fans would argue that the Radeon 8500 has superior anti-aliasing abilities that improve the overall look of the game. At 800 x 600, the Voodoo dished up a frame rate of 183.3fps and achieved a frame rate of 121.8fps at 1,600 x 1,200. The system handled the Crusher demo well, with a frame rate of 112.4 at 800 x 600 and 98.4 at 1,600 x 1,200. The Voodoo system ran the Metropolis Coop demo at an average frame rate of 61.8fps. The average frame rate for the Memphis Suburbs demo was just a tiny bit slower, at 61.6fps.

We were worn out after running exhaustive "tests" on these beautiful pieces of machinery, but we'd do it again in a second. In fact, we probably will. We haven't tried networking them yet, after all. CPU

by Michael Sweet

Top Components For Building Your Next PC

Only The Best Will Do: Losers Need Not Apply

So, you have some money, and you need to spend it. Fast cars, big houses, and executive jets are all good ideas, but the first thing you're going to replace is that clunky old PIII 350 sitting in the corner of your room. You want the absolute best machine you can get. A killer games machine. A supercomputer-class number cruncher. A graphics powerhouse.

Because you're the do-it-yourself type, we figure you'll want to build this beauty from scratch, and we're here to help. We sifted through the best components you can choose for your dream machine. Each of these components is on the shelf right now, and you can combine each component safely with the other items we mention. Putting together a system like this screamer is no more complicated than building a typical PC, so have at it.

The Guts: CPU, Memory & Motherboard

There are really only two players to consider for the CPU: Intel and AMD. Intel's latest is the 2.2GHz Pentium 4 ($530; www.intel.com), while AMD's current leader is the Athlon XP 2000+ ($300; www.amd.com). AMD benchmarks show the XP 2000+ is faster than a 2GHz Intel P4 but not Intel's 2.2GHz. We'd recommend the P4 2.2GHz in this case. The 2.2GHz P4 has 512KB of L2 Advanced Transfer Cache and uses Intel's NetBurst microarchitecture. NetBurst adds several new features to the P4, including a 400MHz system bus, Hyper-Pipelined Technology, and a slew of improvements to the internal floating point and multimedia components of the chip. If you're into overclocking, the AMD Athlon is a little easier to overclock, but the overclocked Pentium can reach higher speeds.

Motherboard. Before you choose a mobo, you need to decide on the number of processors you want. Operating systems such as Win9x and WinMe only support a single processor, but other OSes, including Win2000 and Linux, allow multiple CPUs. If you want your system to be stable, you don't want to deal with Win9x and WinMe. On the other hand, if you want to play games (who doesn't?), most won't run under Win2000, and quite a few have problems under WinXP, which uses the

On The Horizon

Things change quickly in the computer industry, and although many parts of the system you've created will still be current in a few months, newer CPUs and video cards are just around the corner. Intel and AMD expect to up the ante in their processor battle within a month, bringing out 2.5GHz units before the summer.

On the video card front, rumor has it as we go to press that ATI is working on a new chipset. The R300 is a next-generation chipset that will replace the R200, which is the base for the Radeon 8500. Of course, the R300 is supposed to be faster and capable of much more than the R200. A little bird unofficially told us that the R300 is noticeably faster than the NV25 (about 25%), but at press time, ATI wouldn't give us any exact numbers. The R300 has no set release date, and there is no word yet on whether the new board will ship with the Radeon series name or have a completely new name.

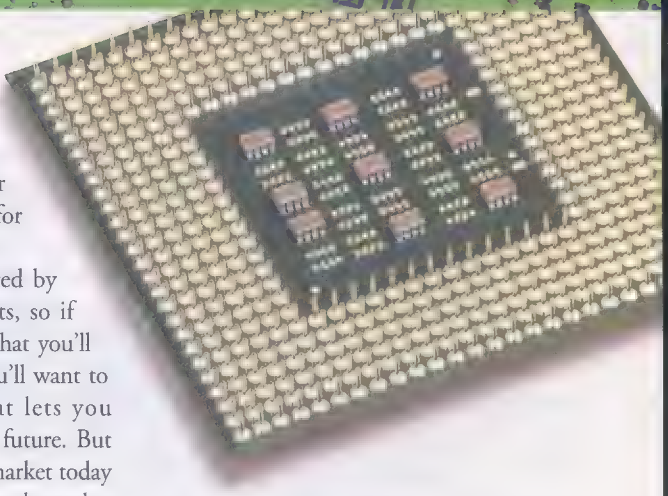
A few other things may change, too, as the summer wears on. Faster DVD writers are soon to appear, offering 4X and eventually 8X write speeds for both DVD-R and DVD-RW drives. Competition for Creative Labs' Audigy sound card is also expected from several vendors, including Guillemot. We may also see high-end audio cards adapted from the professional audio field, including those from Lexicon and Echo. Microsoft and Logitech will have new joysticks and mice, and Creative Labs, Labtec, and others will continue to introduce new speakers in an effort to unseat Klipsch. Maybe you'll have to rebuild your machine by the fall. Time to win the lottery. ▲

Win2000 kernel. The ideal approach would be a dual-boot system, with WinMe for gaming, and WinXP or 2000 for all other purposes.

The 2.2GHz P4 is supported by the Intel 845 and 850 chipsets, so if you decide on the P4, that's what you'll base your motherboard on. You'll want to go with a motherboard that lets you upgrade the Intel CPU in the future. But practically every mobo on the market today allows CPU upgrades, as long as the socket design isn't changed.

There are many manufacturers of Intel 845/850 chipset motherboards, and most are virtually identical to each other in terms of performance and features. Because you have to choose one, though, base your decision on the motherboard's features. You have money to burn, so you'll be buying dedicated boards for video, audio, networking, and the like; you just need a motherboard that has an Intel 850 chipset, supports your 2.2GHz (and future faster designs) P4, and has a lot of PCI and AGP slots.

A good choice is a solid, reliable, well-known board from Gigabyte, the GA-81TXE ($189; www.gigabyte.com). It offers six PCI slots and one CNR (Communications Network Riser) slot in an ATX form factor, along with four memory slots to handle up to 2GB of RAM.



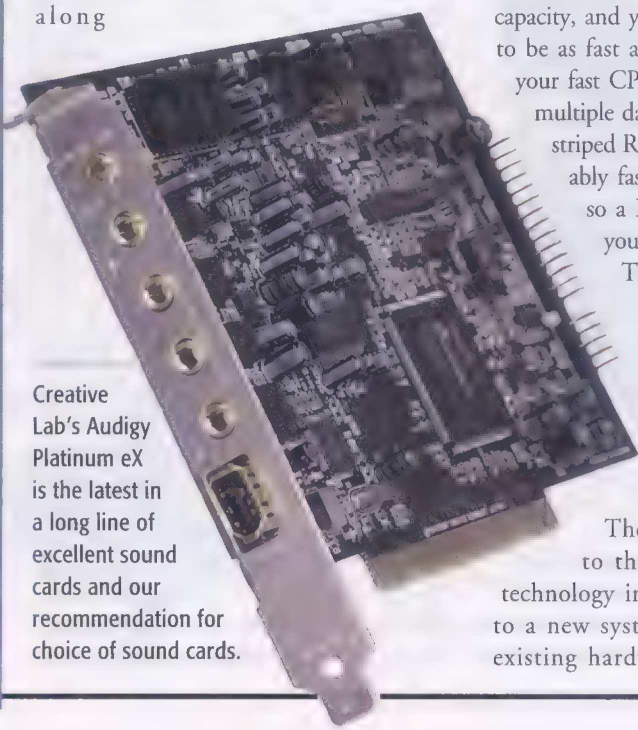
The Intel 2.2GHz Pentium 4 is the fastest CPU currently available. Intel's new NetBurst architecture adds a mess of new features to the P4 line.

Memory. P4s prefer DDR or Rambus SIMMs. Both types are more expensive than the older PC-133 SIMMs, but they run at transfer speeds that are twice as fast as the 133 chips, if not more. You can easily throw a 512MB Rambus chip on the Gigabyte motherboard ($300; www.kingston.com). Almost all mobos have two or more slots for memory, and your Gigabyte has four, so you can easily expand the RAM in the future.

Data Storage

You want a reasonable amount of disk capacity, and you want the disk subsystem to be as fast as possible to keep up with your fast CPU, so you need to consider multiple data drives. Even the simplest striped RAID configuration is noticeably faster than non-RAID setups, so a RAID controller belongs in your machine. (See the "RAID: The Details" sidebar.)

Many mobos include an ATA RAID controller chip produced by Promise, but we'd recommend using a separate board that can handle a lot of drives. There are several advantages to this: You can replace it as technology improves, you can move it to a new system as you upgrade your existing hardware, and you can often



Creative Lab's Audigy Platinum eX is the latest in a long line of excellent sound cards and our recommendation for choice of sound cards.

easily load software upgrades for board-based EEPROMs.

The 3Ware Escalade Storage Switch lets you build an ATA-based RAID array at a fraction of the cost of the fastest FireWire-based SCSI RAID array. Although money isn't the deciding factor here, speed is (and all things being equal, you might as well save a few bucks to spend elsewhere). The 3Ware Escalade 3W-7850 ($680; www.3ware.com) supports up to eight hard drives (although you can start with as few as two in a RAID configuration and add new drives as you need expanded storage) and RAID levels 0, 1, 5, and 10. The Escalade 3W-7850 runs under all flavors of Windows and Linux, making it an ideal choice for your system.

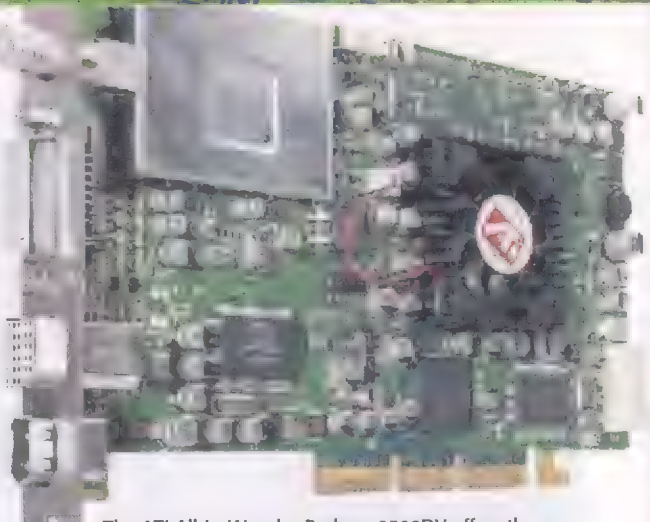
Hard drives. The hard drives themselves are a difficult choice, as there are a lot of excellent, high-capacity drives on the market. Because you are using a RAID array, you want speed more than capacity (you can create large virtual drive volumes with RAID), so you need to look at the fastest drives you can find. 10,000rpm ATA drives are still very rare (although there are a lot of 10,000rpm SCSI drives), so you need to look at 7,200rpm drives.

The IBM Deskstar 60GXP ($151; www.ibm.com) is ideal for your dream machine. Why not go for the new 120GB drive? Simply because the 60GXP has been available for a long time and has been a trouble-free drive with almost zero problems reported. You don't care about the extra capacity a 120GB drive offers because you can add drives to your 3Ware controller whenever you need more disk space. You should attach a few 60-GXP hard drives to the Escalade controller. If you go with four drives, you could set up either a single 240GB disk volume or a mirrored 120GB volume with full fail-over redundancy.

This Panasonic TH-50PHD3U gives you 50 inches of pure video goodness.

Optical drives. CD-RW drives are still a necessary peripheral because of the slowness of DVD drives when reading CDs for games and applications. So, you need a CD-RW drive, and there's none better than Plextor's devices. The current top-of-the-line from Plextor is the PlexWriter 40/12/40A ($209; www.plextor.com), an ATA-based drive that writes at 10X and reads at 40X. BURN-Proof technology prevents the dreaded coaster, and a Flash ROM lets you upgrade the firmware easily.

DVDs are slowly becoming the distribution media of choice, and as you'll likely want to watch DVD movies on your desktop (or at least have the ability to do so), you should add a DVD drive of some type to your machine. You could install a DVD reader, but a writer lets you store both videos and data on 4.7GB discs. So, you might as well add a DVD writer. Pioneer offers the DVR-AO3 ($600; www.pioneerelectronics.com), an internal ATAPI device that offers 2X write speeds and can also read CDs at up to 8X. Between the PlexWriter and the DVR-A03, you have got all your optical bases covered.



The ATI All-In-Wonder Radeon 8500DV offers the fastest graphics engine available for 3-D gaming, as well as the opportunity to overclock.

Sound & Video

A year ago, you had to choose between Diamond Multimedia and Creative Labs sound cards. This year, there's really only one choice: Creative Labs. The Sound Blaster Audigy audio cards are the best the company has ever produced. They boast 96KHz, 24-bit DACs (digital-to-analog converters) and Creative Labs' next generation of EAX surround sound processing. To top it off, there's an IEEE 1394-compliant port for connecting your digital video and photo devices. There are several bundles available for the Audigy, but we recommend the top-of-the-line Platinum eX ($240; www.creative.com) because of the excellent software bundle and the breakout box that gives you front-panel connectors.

Speakers are a no-brainer. Klipsch's ProMedia 5.1 ($399; www.klipsch.com) speakers are still the choice for anyone wanting clear, loud, surround sound. The Promedia speakers have been on the market for a couple of years and have undergone some minor tweaks, but Klipsch wisely doesn't mess with a hit. The latest incarnation of the line provides full 5.1 Dolby Surround and THX certification with a center channel. The ProMedia speakers still serve as a measuring stick for everything else.

The video card market for the last year (since the demise of 3dfx) has boiled down to ATI vs. NVIDIA. As we go to press, the current top of the line is NVIDIA's newly released GeForce4 Titanium series, which features the NV25 ($399; www.nvidia.com). Check it out on page 18 of this issue. See the "On The Horizon" sidebar for a glimpse at how ATI plans to respond.

RAID: The Details

RAID (redundant array of independent disks) is a subsystem of two or more hard drives treated by the OS as a single drive. A RAID configuration takes advantage of the data redundancy inherent in using multiple drives by letting you spread data across more than one physical drive. By using checksums, if one drive fails it is possible to re-create the lost data. The speed at which the data is recovered depends on the RAID level adopted. Although there are many RAID levels, only four are commonly used in PCs: RAID 0, 1, 5, and 10.

RAID 0 stripes data across two or more drives. This means that if you have two drives and want to write 1GB of data, half will be written to each drive (in theory taking half as long).

RAID 1 is disk mirroring. Each drive has a duplicate containing an exact copy of the first drive's contents, offering full data redundancy. RAID 1 offers an increase in data read performance but not write performance.

RAID 5 stripes data across multiple drives and uses an error-correction scheme to write checksums across all the drives. Each drive in the array holds data and error correction information for the other drives. RAID 5 is the most widely used of the RAID levels.

RAID 10 is a combination of RAID 1 and RAID 0. RAID 10 offers scalability and redundancy but is not a new product: It's simply a combination of older RAID implementations. RAID 10 subsystems tend to be expensive.

Klipsch's Promedia 5.1 speakers are still the best on the market for any PC application. They rumble contentedly with the Creative Lab's Audigy Platinum eX sound card.

All The Rest

Have you forgotten anything? Quite a bit, in fact. Obviously, you need a case to put all of your equipment in. A standard ATX case won't hold eight ATA drives, so if you want to fully pack the machine, you need either a double-width case or one designed with extra drive bays (which usually means a tall tower). There are many excellent cases available from Case Depot (www.casedepot.com). But we'd recommend a killer aluminum case such as those from Lian Li. The PC-72 (which is available in a couple of minor design variations) does the trick ($239; www.lian-li.com).

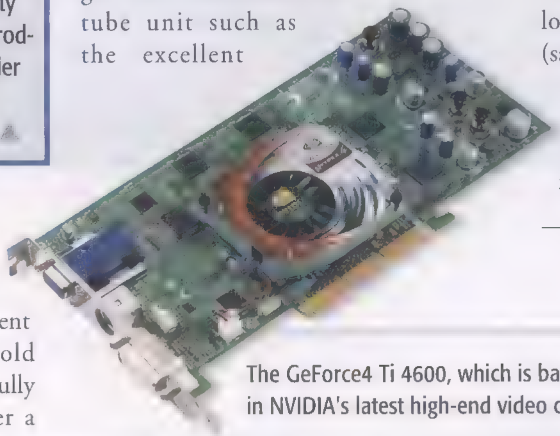
You'll also need input peripherals, including a mouse, joystick, and keyboard. The Logitech iFeel Mouse ($40; www.logitech.com) is a good choice: It offers force feedback as the mouse rolls over buttons and items on the screen. For a joystick, the Logitech WingMan Strike Force 3D is hard to beat ($90; www.logitech.com). It provides a comfortable grip and great force-feedback cues. For a keyboard, those who can touch type find the Microsoft Natural Keyboard Pro the best choice ($75; www.microsoft.com). If you're a hunt-and-peck type, any of the standard keyboards will do.

Oh, and you need a monitor. A big one that looks beautiful. You could go for a conventional tube unit such as the excellent ViewSonic 21-inch models (www.viewsonic.com). But heck, you want a plasma flat screen unit that hangs on the wall or sits on the end of your desk, gives you a 50-inch view, and works with all the screen resolutions you could ask for. The unit of choice right now would be the Panasonic TH-50PHD3U ($15,000; www.panasonic.com). Attach that to your Radeon and get out of the way. Those bad guys are gonna pounce on you!

Of course you'll need a way to get online. You could use a standard 56Kbps modem, but why would you want to? Get a fast connection with ISDN, DSL, or broadband. The choice depends on where you live and what options are available to you. Wherever you live, you can use DIRECWAY (also known as DirecPC), Hughes Network System's 400Kbps (download) satellite system that uses the same dish as DIRECTV (www.direcway.com). You'll be able to watch television on your Radeon video card and Panasonic monitor and surf the Web at the same time. The hardware is almost free, but a monthly cost of around $40 means this is the solution for you only if you plan to spend a lot of time surfing but not waiting for Web pages to load. You'll still need a 56Kbps modem for the uplink, and one of the best is 3Com's Performance Pro FaxModem ($83; www.3com.com) and the DirecPC (download only from satellite) or DirecWay (satellite both ways) package.

Now stand back and admire your work. The entire system is fast, sleek, and can't be beat, at least until next month.

by Tim Parker



The GeForce4 Ti 4600, which is based on the NV25 GPU, is the first to ship in NVIDIA's latest high-end video card lineup.

room to burn

VINYL
DIGITAL VIDEO
DATA BACKUP
ORIGINAL MUSIC
DIGITAL PHOTO
MP3

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Cool It!

H20 + Electricity = One Frigid Beast

Traditionally, power users have been considered hard-core gamers with top-of-the-line systems. Today, however, "power user" isn't a label only the lunatic fringe wears. A CAD worker who spends hours stressing her system rendering designs considers herself a power user. Not to mention video/music editors, game designers, and animators.

In short, power users aren't just gamers and overclockers. With the Internet's vast supply of online resources only a click away, more DIYers are taking on their own PC maintenance, upgrades, and modifications—something many people probably wouldn't have attempted five years ago.

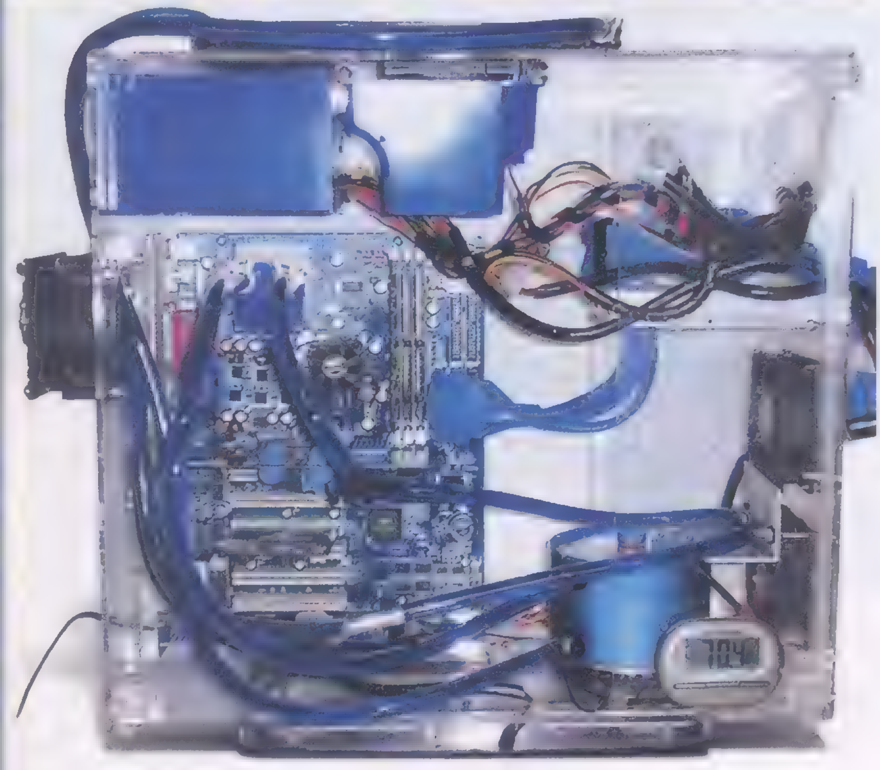
One thing many users still probably haven't given much thought to is watercooling their PCs. Water + electricity has always been a no-no. But to power users, watercooling is just another method of getting the most from their systems. Before you open the floodgates and let a half-gallon of liquid flow through your computer, however, you need to understand the basics.

The current method of cooling a PC's processor has remained virtually unchanged for 10 years. In one form or another, the PC industry has relied primarily on heat-sink technology and fans for cooling. We'll look briefly at heat sinks, but we'll focus more on watercooling's advantages and how to accomplish it.

Heat In The Sink

There are two common approaches to increasing a PC's performance. The first and most common approach is simply upgrading to the best CPU and/or motherboard for more processing power or the latest video card for more pixel-crushing ability. With processors being ridiculously inexpensive the last 18 to 24 months, many users simply lay out the money to increase speed.

Another approach that's growing quickly in popularity is overclocking. This method is becoming widely accepted and even encouraged by a few PC manufacturers. Motherboard manuals are now dedicating entire chapters to overclocking. Some vendors even sell overclocked products directly from the factory.



This image shows the configuration of a typical watercooling system. How you set up your own watercooling system is limited only by your imagination.

The basic components of a watercooling system effectively replace the air-cooled components in your PC, but they also require more space. If space is an issue, low-profile radiators and wet/dry water pumps that require no reservoir are alternatives.

Simply put, overclocking is adjusting computer settings to enable a system to run above factory specifications. Overclocking entails adjusting the FSB or multiplier to achieve greater CPU speed. For example, consider a low-price Intel Celeron or AMD Duron running at 1GHz that normally has a 10X multiplier and a 100MHz FSB (10 x 100 = 1,000 or 1GHz). In the case of an Intel CPU with a nonadjustable multiplier, overclocking is limited to raising the FSB or, theoretically, running the processor at 1.2GHz (10 x 120 = 1,200), thereby getting a free 200MHz boost in speed.

Speed is great, but heat is its byproduct. Whether you upgrade to a new processor or overclock it 300MHz past its rated speed, both scenarios will generate heat. A higher-end overclocked processor now needs a high-end cooling solution. Until recently, the only realistic option was getting a bigger heat sink with a bigger (and louder) fan.

A heat sink is nothing more than a piece of metal—usually aluminum, copper, or a combination—that has a flat mating surface for contact with the CPU. The heat sink's flat side absorbs heat, drawing it away from the processor. The heat sink's other side has extruding fins that dissipate the heat. Mounting a fan to the fins greatly enhances the effect.

Using this technique, you could conclude that bigger is better. Oddly enough, the PC industry has actually followed this course of thinking and introduced bigger heat sinks and larger fans to cope with higher processor temperatures. A side effect of having large fans is the noise they produce.

Test The Waters

This is where watercooling comes in. Watercooling, when done correctly, not only is a far more effective cooling solution, but it's as safe, if not safer, than conventional cooling. Plus, it's much easier on the ears than screaming 7,000rpm fans. However, you need to know a few things before configuring your system for watercooling.

First, you should thoroughly research watercooling products before you purchase them. The Internet is a great tool, but it can make buying decisions more difficult. Stick with proven resources and trustworthy information sources. Anyone can put up a site claiming to be a watercooling pro, but not everyone is.

Common sense also goes a long way when it comes to actually setting up a watercooling system. Do you really need a solid-gold waterblock because the thermal properties are better than copper? Do you need a 6,000-gallon-per-hour pump just because a "pro" says it's a good idea? To be safe, remember that watercooling your PC applies the same principles of cooling as a vehicle's engine uses. In general, water flows through a block where the heat is removed. The warm water travels to the reservoir/radiator where it's cooled by fans blowing air through the radiator. The cool water begins the journey again through the block, removing heat.

Finally, even if you decide to use an assembled watercooling kit (which we will discuss more later), learn the various parts and how to service and maintain the system. Most watercooling gurus know their systems inside out before they experiment, adjust, or customize their watercooling systems.

What You Need

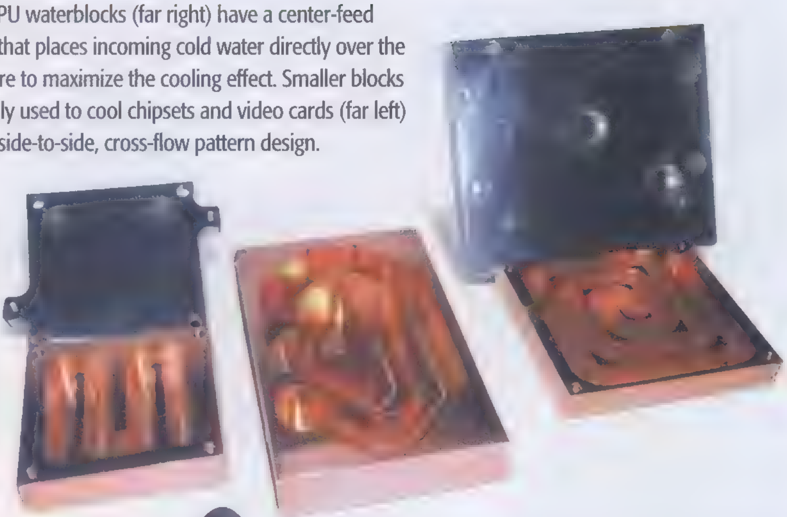
What we'll cover is a generic guide to watercooling your PC. You can apply these steps and principles to any system you want to watercool, regardless of performance level. Currently, two basic styles of watercooling components are on the market: components that require three-eighths-inch ID (inside diameter) hose and those that require three-eighths-inch OD (outside diameter) hose. The difference between the two styles boils down to one thing: hose size. Today, the most common components (waterblocks and radiators) use fittings that require three-eighths ID hose.

Size. Obviously, size is extremely important when selecting components for compatibility reasons, but also for the overall flow characteristics of your system. The added benefits of assembling a system that uses three-eighths ID size fittings are availability and choice. Because most vendors use the three-eighths ID hose, you're free to mix and match components from multiple retailers. Also, you can find these fittings at most hardware or auto parts stores, which makes system maintenance and expansion a snap.

Components that use smaller three-eighths-inch OD hose are harder to find, offer less flow capacity, or require special fittings. Many proprietary watercooling systems use smaller lines and specialized fittings to limit you to the components a particular manufacturer offers.

Waterblocks. The waterblock is the heart of the system and the component that receives the most attention. Almost

Most CPU waterblocks (far right) have a center-feed design that places incoming cold water directly over the CPU core to maximize the cooling effect. Smaller blocks generally used to cool chipsets and video cards (far left) have a side-to-side, cross-flow pattern design.



There are two basic types of water pumps: submersible pumps, which require a reservoir (the yellow unit), and wet/dry pumps. We suggest using a reservoir with any style of watercooling system to add the coolant capacity a reservoir provides.

Radiators are usually available at a local auto parts store. Some of the best low-profile compact units are motorcycle transmission coolers or oil coolers for heavy equipment.

every waterblock currently available is made of copper, although some are made of other materials, such as a copper base plate with an aluminum-coated housing to prevent corrosion.

Choosing a waterblock depends on how you want to mount the block to your CPU. Many current designs offer multiple methods of attaching the block, such as using the four mounting holes in current AMD motherboards or clamps that utilize the retention tabs on a ZIF socket. Choose the method that best suits your needs.

Pumps. Water pumps are one of the easier components to locate. They're readily available at local pet stores or malls. There are two basic types: submersible (in water) and dry. Quality units, such as those manufactured by Eheim (www.eheim.com), are dry and submersible. Water pump capacity is also an issue. Too little water flow through a system can lead to overheating. Too much pressure can lead to hose/clamp failure. A pump with a 300GPH (gallon per hour) rating is more than adequate for most systems.

Radiators. Selecting a radiator is straightforward but can be tricky. The most common and easiest radiator to use is a motorcycle/automotive transmission cooler or the like. Automobile heater cores are also extremely popular because of their high capacity, availability, and ability to dissipate heat. These units are normally made of aluminum or copper tubing surrounded by flat, corrugated aluminum fins. A number of online retailers sell watercooling radiators that are adapted to work with three-eighths-inch ID tubing. You'll need to purchase the appropriate fans for your radiator once you settle on a unit.

Reservoirs. Retailers typically offer water pumps preinstalled in a reservoir. Although this limits your choice of water pumps, it's also very convenient. If you choose a pump not equipped with a reservoir, we highly suggest making your own reservoir or finding one that's inexpensive and flexible enough to easily modify to your needs. A plastic jar with a lid that screws on works well.

Hose. The hose for watercooling systems comes in several varieties. The most desirable hose or tubing is silicone

When selecting a reservoir, consider the pump's price, size, and coolant capacity; if it comes preinstalled; if you can easily replace it; if it requires 12V DC power or 110V AC; and if a homemade model will work instead.

or surgical latex because of its flexibility and strength. This tubing is more expensive and hard to locate, but you can try a medical supply company. The most widely used tubing is vinyl. You can find it in practically any hardware store. A 10-foot roll will set you back about $3. There are two types of vinyl tubing, one being softer and more pliable. You can also use plain black hose from an auto parts store. It works like a charm and is far more durable than the other choices.

Misc. Other items you'll need, including hose clamps and algae/corrosion prevention solutions (such as Water Wetter), are available at auto parts stores for a few dollars. One bottle of corrosion treatment will last a long time. Hose clamps are very inexpensive, so grab a handful of extras.

Put It Together

Getting started requires assembling the complete watercooling system outside of your system before actually installing it in the computer. This will ensure everything works properly before it's in the system and you discover a component is bad. This is also a good time to check for leaks or seepage from the waterblock or fittings.

Step1. Lay out your components in a circle in this order: pump/reservoir; CPU waterblock; chipset or video card waterblock (if used); radiator fan assembly; and bowl of water.

Step 2. Connect the pieces of hose to the components in this order:

- Connect one end of hose to the output fitting on the reservoir or the pump. Connect the other end of the hose to the inlet (center) fitting on your CPU waterblock.
- Connect one end of hose to the outlet fitting on the CPU waterblock. Connect the other end of the hose to the inlet side of the chipset or video card waterblock (if used).

Clear vinyl and silicone-based hose are the most common types of hosing used in watercooling systems. Silicone hose is harder to find and more expensive. Vinyl is inexpensive, but harder to bend and prone to kinks.

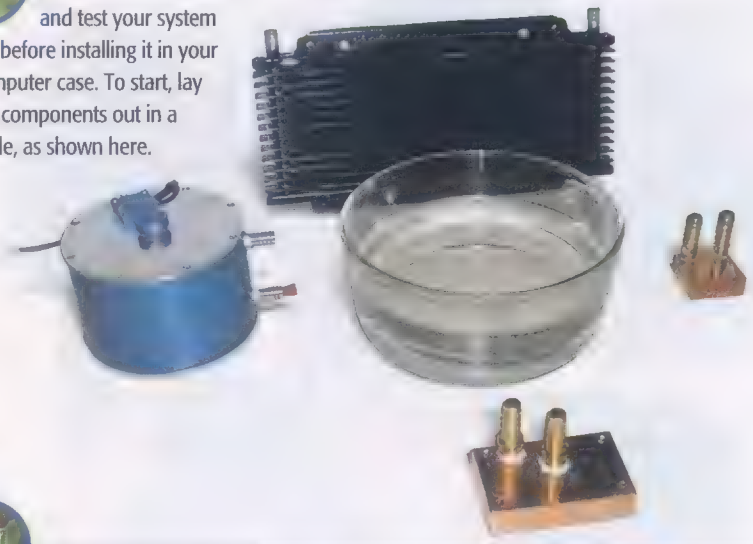
- Connect one end of hose from the outlet on the chipset or video card waterblock (if used). Connect the other end of hose to the inlet side of the radiator.
- Connect one end of hose to the outlet of the radiator. Place the open end of hose in the bowl of water.
- Take a short section of hose and place one end in the bowl. Connect the other end to the inlet of the reservoir. You'll remove this hose section later after bleeding the air from the system.

Step 3. Once everything is connected, fill the reservoir and start the pump. The water bowl lets any air in the system escape while the cooling circuit fills. A large amount of bubbles and trapped air will escape through the line leading into the water bowl. Let the pump run until you're confident most of the air is out of the lines. Turn the pump off and squeeze or crimp the end of the line running from the radiator into the bowl. Now plug that end into the inlet fitting on the reservoir, first removing the small section of hose already in place. Turn the pump back on and let the system run a few hours, checking periodically for leaks. Once you're sure everything checks out, drain and disassemble everything. You're now ready to install the watercooling setup in the PC.

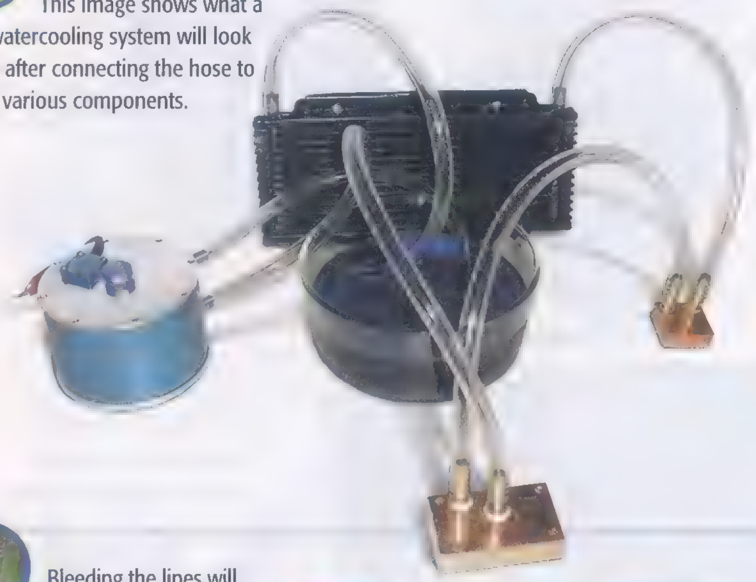
Step 4. Typically, you'll find a location for the radiator and reservoir/water pump assembly first. You'll probably need to drill a few small holes where you plan to attach the reservoir, as well as the radiator assembly. The most common location for the reservoir/water pump assembly is the base of your case, generally in the open area below the drive area. You should attach the radiator to an area where cooler outside air will be drawn through the radiator into the case. We find mounting the radiator on the outside of the case much more efficient than attaching it inside the case. Once you map out and install these items, it's time for the waterblock installation.

Step 5. For our installation, we'll use a waterblock that utilizes the four mounting holes on newer AMD motherboards. To install this type of waterblock, remove the

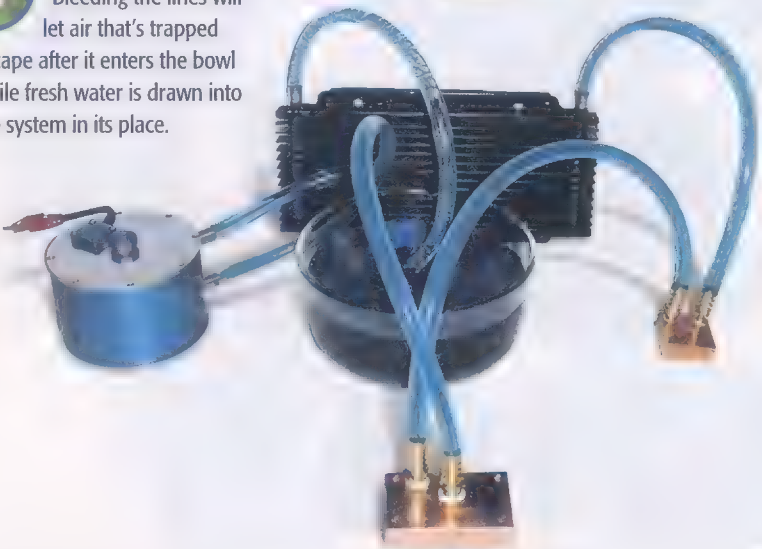
1 You should assemble and test your system before installing it in your computer case. To start, lay the components out in a circle, as shown here.



2 This image shows what a watercooling system will look like after connecting the hose to the various components.



3 Bleeding the lines will let air that's trapped escape after it enters the bowl while fresh water is drawn into the system in its place.



4 Most reservoir/pump assemblies easily fit in a midtower ATX case. This assembly has a predrilled base to attach it to the case chassis. You can fasten a reservoir without a base using a fire extinguisher bracket or a few nuts and bolts and a wide strap.

motherboard from the case. You need to install the four long screws (usually plastic) that come with your waterblock. With the screws in place, prep your CPU as you would if installing a standard heat sink. A clean rag and small amount of alcohol will remove old thermal paste. Apply a small amount of fresh thermal compound and slowly lower the waterblock into place. Install the four spring-and-nut assemblies to each screw, holding the waterblock in place. Tighten the nuts in a crisscross pattern. Don't overtighten the nuts.

If you are also installing a video card waterblock, you'll follow the same basic procedure as for a CPU by cleaning the GPU, applying a thin layer of thermal compound, and then attaching the waterblock, fittings facing away from the motherboard.

Step 6. With the components in place, it's time to route the hoses. Keep them away from rough or sharp surfaces, and avoid making sharp angle bends to avoid kinking. Use hose clamps to keep the hoses firmly attached, taking care not to overtighten them or damage the hose.

Use the same method to fill/bleed the system as we did earlier. Fill the system again, this time with distilled water, making sure you have the proper amount of anticorrosion agent added to the water. Fill the reservoir at least three-fourths full before starting the pump. Continue to slowly add water to the reservoir as the water works through the system. Completely bleed the system of any remaining air before affixing the last hose, sealing the system. Let the now-closed system run for a short period or until you're comfortable any trapped air has safely moved into the reservoir.

Step 7. Initially, enter the BIOS and check the CPU's operating temperature. Monitor your system temps for a few minutes and look for any wild fluctuations or abnormal temperature readings.

Our Results

The difference between a watercooling configuration and an air-cooled one is nothing short of amazing. We set up a test system in a controlled environment, attempting to keep the ambient room temperature as stable as possible. To test, we used a 1.67GHz Athlon XP 2000+, 512MB of PC2700 Corsair DDR, an EPoX EP8KHA+ motherboard, an ABIT GeForce3 Ti 500 video card, and a Western Digital 40GB ATA133 hard drive. For air-cooling testing, we equipped the system with a large Thermaltake VOLCANO 7 heat sink with a copper core. It's easily one of the largest coolers on the market.

The air-cooled system had an average CPU temperature of 129 degrees F under a full load during testing. The water-cooled system had an average CPU temperature of 90 degrees F. A near-40-degree difference is a testament to the power of watercooling.

Another aspect often overlooked in watercooling is the rate at which the temperature returns to idle compared to an air-cooled system. Our air-cooled system took more than 1:10 (minutes:seconds) to return

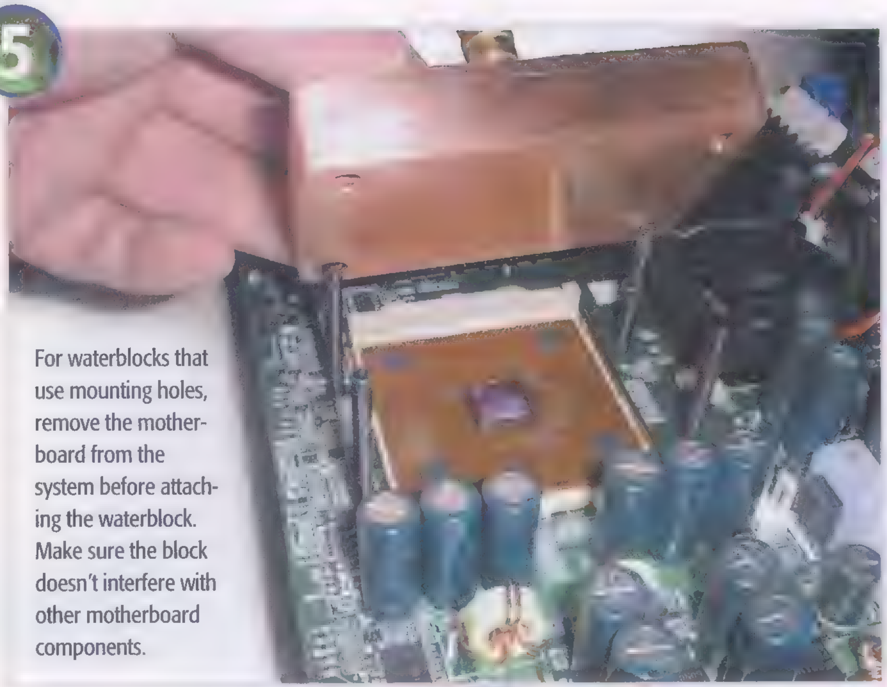
A Disclaimer

Watercooling is a safe and effective alternative for cooling a PC—when done properly. The cooling effects of watercooling are far greater than any conventional air-cooled system. However, improper setup and maintenance can result in serious damage to your system. Take extreme care and caution to avoid harming your system.

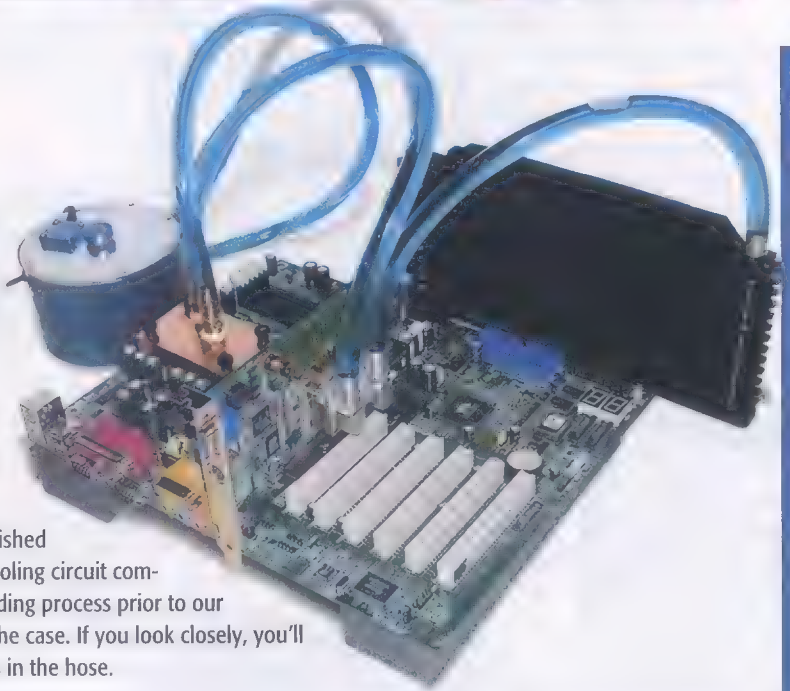
To minimize the risk, thoroughly check and double-check every installation step. Make sure all fittings are tight but not too tight. Check hose routings for bends, kinks, and areas where the hose can come into contact with sharp surfaces. As a precaution, test your watercooling setup before installing it in your computer, as outlined in this article.

Thoroughness and attention to detail will limit the chances of accidents, but they don't guarantee problems won't occur because of unforeseen circumstances, such as product defects or mechanical failure.

5



For waterblocks that use mounting holes, remove the motherboard from the system before attaching the waterblock. Make sure the block doesn't interfere with other motherboard components.



6

Here our finished watercooling circuit completes the bleeding process prior to our installing it in the case. If you look closely, you'll see air bubbles in the hose.

to an idle temperature. The water-cooled system did it in less than 19 seconds.

What about retail watercooling kits and systems? Watercooling has become so popular with the performance crowd that at least a dozen companies online offer complete kits. Before you purchase a watercooling kit, consider the following: Should you piece together your own system or purchase a kit? Which method is more cost-effective? Finally, which method of watercooling will give you the best performance?

If this is your first water-cooled system, we strongly recommend going with a kit from a reputable dealer. The kit will contain everything you need to get up and running in little time. You can always customize the kit as you become more familiar with your system.

It costs about the same to piece a system together as it does to buy a complete kit. The total cost to build a custom system ranges from $125 to $300. An average kit is $150 to $200. The actual performance difference between the two types is minimal. Obviously, a retail kit won't give you the satisfaction of building your own kit from the bottom up, but what a kit does offer is a starting point to get into watercooling.

The performance from watercooling is unbeatable. The experience is one of a kind. We've only covered the basics here. As your experience grows, more extreme watercooling projects await you. CPU

(For more information about online watercooling resources, check out www.smartcomputing.com/cpumag/apr02/watercooling.)

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by Steve Lynch

What You'll Need

The items you need for a watercooling system will vary in cost and availability. This list gives you a general idea of what to expect. The lower prices represent entry-level products; the higher prices represent high-performance products. To be safe, add an additional 10% to 15% to your budget. With the exception of the waterblock, you can purchase most items locally at hardware, auto parts, or pet supply stores. Shipping and handling costs aren't included here:

The Basics:

- Waterblock: $25 to $45
- Pump: $35 to $65
- Reservoir: Free to $25
- Radiator: $35 to $50
- Fans: $12 each
- Tubing: 10 feet for about $3
- Anticorrosion agent: $4 to $10
- Clamps: $6 for 16
- Thermal Paste: $5 to $10 (normally included with the waterblock)

Optional Basics:

- Chipset waterblock: $15 to $25
- Video card waterblock: $20 to $25
- Water additives: $20 to $25

You just stepped off the plane, yet you can't wait to sit down again.

The Lincoln LS at Hertz.
The luxury car you're yearning for is now part of
the new Hertz Prestige Collection.

Rent the Lincoln LS and sit in the lap of one of the luxurious performance vehicles included in the new Hertz Prestige Collection. Simply reserve the one you want (available at select U.S. and Canadian locations) for your next business trip or vacation. For reservations, call your travel agent or the Hertz Prestige Collection reservation line at 1-800-654-2250, or visit us at hertz.com. And you'll get special services that are exclusive to our Prestige Collection. Reserve your seat today.

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Prestige Collection

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The Bleeding Edge Of Software

by Warren Ernst

Inside The World Of Betas

Fortune telling becomes an exact science when it comes to working with betas. This month we bring you six glimpses into the future of software.

Download Accelerator Plus 5.0 beta

Official product name: Download Accelerator Plus
Version # previewed: 5.0 beta
Publisher: SpeedBit
Developer and URL: www.speedbit.com
Product URL: www.speedbit.com
ETA: Q2 2002
Why you should care: Faster downloads free over nearly any connection.

A lot of products claim to speed up an Internet connection. Most remind me of bottles of snake oil of yore. So, it was with great trepidation (and a recently Ghosted hard drive) I downloaded and installed Download Accelerator Plus. After a week of using it, it does what its name suggests, speeding up downloads—most of the time.

Much like GetRight and Go!Zilla, DAP is a small app that acts as a download manager. When you start to download a file, DAP references its own database for fast alternative download sites. In addition, it divides a download into multiple parts and obtains them via multiple, concurrent connections.

Sometimes, especially with a broadband connection, this isn't necessary because the server you're downloading from can saturate your connection fine. However, for downloads maxing out below the theoretical best download speed, DAP works quickly and easily.

DAP resumes interrupted downloads from most servers, redials lost connections for dial-up users, collects requested downloads throughout a day and retrieve the files at night, scans downloads automatically, and highlights links in a Web page that link to downloadable files. A billboard that displays banner ads during downloads is another DAP feature. Most ads were for DAP's commercial version, which omits banner ads.

It's not entirely clear why this version is a beta because it never crashed or caused system instability. It seemed to have a high level of fit and finish. Overall, it's well worth checking out. ▲

StrokeIt 0.9 beta6

This month's winner for Most Humorous Product Name is StrokeIt, a very stable beta. StrokeIt acts as a macro system for mouse movements, quietly running in the background keeping track of how the mouse cursor moves. When it senses one of 50 motions, it performs an action (normally hotkeys, but there's some flexibility).

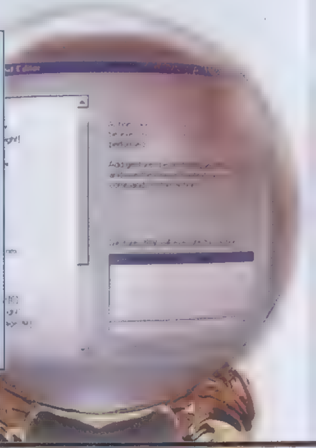
For handheld users, gliding a pointer to perform actions is natural. If you're not, this takes getting used to. Once you memorize or create commands and strokes, you wonder why someone didn't think of this sooner.

StrokeIt's only problem is that it cries out for another mouse button. By default, you must press and hold the right button while moving the cursor. This makes right-click-dragging icons tricky and accessing pop-up menus tough sometimes. You can use the middle or left mouse button, but these buttons normally have uses in Windows.

If you don't use the right mouse button much, StrokeIt is a joy. Creating new shortcuts or motions is simple. When finalized, StrokeIt will be free for personal, noncommercial use. Otherwise, it will cost $10.

The beta is rock solid, lacking only built-in documentation. Leave keyboard shortcuts and the File Menu behind and give StrokeIt a spin. ▲

Official product name: StrokeIt
Version # previewed: 0.9 beta6
Publisher: TCB Networks
Developer and URL: TCB Networks; www.tcbnetworks.com
Product URL: www.tcbnetworks.com/strokeit
ETA: Q2 2002
Why you should care: Add macros and shortcuts to another device.



Mozilla 0.9.7

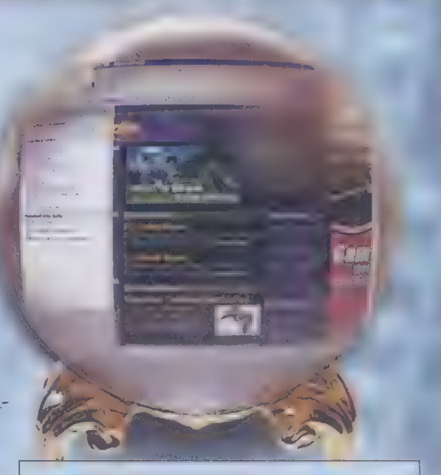
Mozilla thumps out beta version after beta version of its open source browser favored by Linux lovers and anti-Microsoft zealots and folks trying to zig around the Internet when others zag. Version 0.9.7 is fast approaching the magic 1.0 status after two years of development. This version feels like it's almost ready for prime time.

Feature-wise, Mozilla has a Web browser, of course, but also an e-mail program, Usenet newsreader, IRC chatting client, WYSIWYG HTML editor, AOL Instant Messenger, and Internet radio player. Each component isn't necessarily the best in its category but is certainly good enough for daily Internet use.

If you regularly use Internet Explorer and Outlook Express, Mozilla might be a refreshing change. Its browser has a Sidebar feature to conduct Internet searches, review and manage bookmarks, look at material related to the page you're viewing, or unfortunately, view advertisements. There are only Forward, Back, Stop, and Reload buttons, plus a Print button, but this seems enough. You can view pages in tabs (a la Opera) to reduce window clutter on your Desktop.

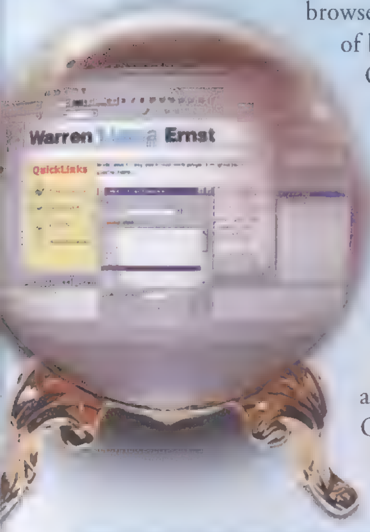
The e-mail module finally works with multiple e-mail accounts in one window without using Netscape's cumbersome Profiles screen, but the module still maintains a classic three-pane view with folders, subject headers, and message content. Options abound for automatic message checking and filtering rules. Configuring these seems easier than in corresponding Microsoft products.

Despite its features, it's hard to overlook the betaness of Mozilla, which sometimes seems to crash when performing simple tasks, such as printing, sorting, or scrolling. More positively, crashes automatically result in debugging information being sent to the Mozilla team. ▲



Official product name: Mozilla
Version # previewed: 0.9.7
Publisher: The Mozilla Organization
Developer and URL: The Mozilla Organization; www.mozilla.org
Product URL: www.mozilla.org
ETA: Q3 2002
Why you should care: The leading edge of alternative browsers lives at Mozilla.

Blink 1.0 beta



One of the bigger problems for Web page creators is making sure the pages look good in different browsers. A bigger problem is that there are dozens of browsers (including different versions and OSes). Checking them all can be extremely tough, if not impossible.

Blink—named after an unpopular HTML tag supported by Netscape—is an HTML editor that makes checking for browser compatibility its primary focus. If you want to see what your HTML code looks like with Internet Explorer 1.0 or Netscape 1.1, Blink is the HTML editor that comes to mind.

Many of Blink's unique features stem from an almost obsessive need to check for compatibility. Once you specify the browsers to check against, Blink validates the code as you type it while running it through a validator. Blink can also reformat code to several specifications, including W3C.

Other features include autocompletion of HTML tags in non-WYSIWYG mode, a resolution window with dotted lines indicating where graphics will cut off and where lines will wrap at different resolutions, a color picker that converts colors into hexadecimal, and a library of widgets that inserts code snippets into files for dynamic content. Blink also has the standard features, such as a rudimentary site manager, built-in FTP client, and full drag-and-drop ability with other programs, the Windows Desktop, and Blink's own toolbars and palettes.

In other respects, Blink feels like a 1.0 beta. There are plenty of menus or dialog boxes that draw incompletely or are half empty. Random crashes occur, and the Preview/WYSIWYG/Code view tabs can confuse you if clicked too quickly. But for checking HTML against older browsers, Blink is a worthwhile download. ▲

Official product name: Blink
Version # previewed: 1.0 beta
Publisher: Wojanware
Developer and URL: Wojanware; www.wojanware.com
Product URL: www.wojanware.com
ETA: Q2 2002
Why you should care: Writing HTML for different browsers has never been easier.

Infinite Loop

Got Protection?

You can use Symantec's Security Check site (www.symantec.se/securitycheck) to test your PC for security breaches. Be warned that the results can be a little embarrassing. Of nearly 400,000 PCs Symantec tested:

79%	had browsers with privacy vulnerabilities
44%	had no antivirus protection
32%	had a virus or Trojan horse

Source: Symantec, June 2001.

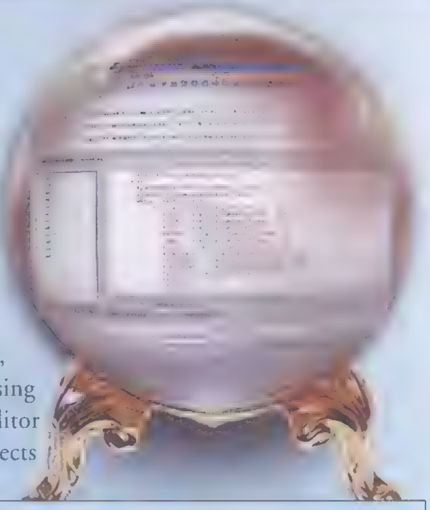
Zend Studio 2.0 Beta

One of the hottest languages for adding dynamic content to Web pages is PHP because of its speed, elegance, built-in features, and comprehensive server support, including Microsoft's IIS and Apache. PHP editors are becoming more available, but editors aren't always enough. HTML files work right off the hard drive, no server needed. That's not the case with PHP. A PHP interpreter installed on a system and Web server (or reasonable facsimile) is needed, as well. Usually, development entails writing files locally, transferring them to the server, testing them in the browser, and going back to the editor to look for errors in the code.

This can take a lot of time and patience (trust me on this), but Zend's Studio 2.0 may be a solution. ZS installs the PHP interpreter (version 4.10), an internal server daemon, an elegant development environment, and if necessary, the Java run time library that glues it all together. The professional installer places all the bits where they belong, and the entire setup doesn't require a reboot.

The development environment has several parts. Centrally located is a smart text editor that's versed in PHP and HTML. The editor color-codes tags, attributes, variables, routines, and more for easy viewing. It can also automatically indent lines as you work or scan an existing file and indent after the fact. Automatic tag completion is also nice, although in this beta, auto-completing closing tags were generated as starting tags. The editor can also group collections of files into Projects and natively put FTP files where they are needed.

Debugging code is where ZS shines. Setting up breakpoints, viewing output and variables, and monitoring the stack while it runs PHP scripts directly is simple and fast. PHP beginners would do well to learn with ZS. Experts will be thankful they tried it.



Official product name: Zend Studio
Version # previewed: 2.0 Beta
Publisher: Zend Technologies
Developer and URL: Zend Technologies; www.zend.com
Product URL: www.zend.com
ETA: Q1 2002
Why you should care: Writing and debugging PHP scripts made easy.

WinRAR 3.00 beta 1

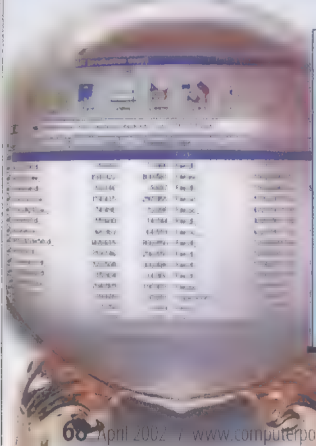
Zip files may be the standard in PC-software compression today, but there are other options. For die-hard Windows users, the other option is a RAR file. WinRAR is the king in this arena. Version 3.00 beta has enough goods to consider making it your primary compression program. (Version 3.00 beta 2 was released as we we're going to press.)

The WinRAR package comes with command line and GUI versions, a rarity these days. The GUI is nice. On the surface it looks a lot like a WinZIP window, listing the contents of an open Zip or RAR file in a table. However, WinRAR acts more like a file browser letting you navigate files and folders easily. You can also drag files into the WinRAR window or right-click a file in Windows Explorer.

Although WinRAR works well with Zip files (the Zip files created during testing were fractionally smaller than using WinZip), WinRAR really shines when using alternative compressed formats. TAR, GZ, and many Unix/Linux compressed files open natively (without littering your drive with temporary files), and you can convert them to common Windows compression formats with a few clicks. The RAR files WinRAR creates are substantially smaller than corresponding Zip files, plus you can modify WinRAR's compression algorithms for specific data types for even better compression.

Creating self-extracting compressed files is a joy. Not only does WinRAR support spanning media (useful for floppies), it also offers DOS and Windows self-extractors. WinRAR even lets you make different templates, almost like a miniature installation creation program such as InstallShield or TurboSFX.

You wouldn't guess WinRAR is a beta after using it. No bugs popped up during my use, and the entire program felt more polished than ever. Even the beta's Help file is top-notch. If you regularly deal with compressed files other than Zip, check out WinRAR, pronto.



Official product name: WinRAR
Version # previewed: 3.00 beta 1
Publisher: Rarsoft
Developer and URL: Softronic Oy; www.rarsoft.com
Product URL: www.rarsoft.com
ETA: Q2 2002
Why you should care: There's no easier way to make or use RAR files.

Send Us Your Betas

Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go-around. Send your prospects to bleedingedge@cpumag.com.

Software DVD Players Unwrapped

Widespread adoption of DVDs on computers took years longer than anyone anticipated. But at last, drives for desktops and portables are cheap. That means watching your shiny new blockbuster on your PC at home, on the road, or in the air. But wait, you need a software DVD player. If you have a DVD drive, it probably bundled a player app. However, all players aren't created equal. Spending more for one with better features may be worthwhile. Conversely, a free player may be good enough.

CyberLink PowerDVD XP 4.0

PowerDVD is the best DVD player on the market. The app repeatedly surprised me with a refinement that makes it feature-rich but not cumbersome. For example, the controller pad's jog dial controls fast forward and reverse speeds, which is intelligent by itself. But you can accomplish the same tasks with your mouse's scroll wheel. Cool.

Like WinDVD, PowerDVD includes a screen capture button. However, the implementation copies data into screen memory so you can drop the image in an editing program rather than retrieve it from a buried subfolder. PowerDVD lets you bookmark favorite scenes and browse them as thumbnails. The installation even lets you enable DMA acceleration for your DVD drive and whiz through a few video benchmarks to ensure playback is acceptable.

I didn't award PowerDVD a perfect score because its codec isn't quite as hardy as with other players I reviewed. While multitasking, I noticed PowerDVD tended toward lower frame rates, even with hardware acceleration enabled. Running by itself, however, PowerDVD performed beautifully and had no compatibility or stability issues.

Audiophiles will love PowerDVD's audio support for everything from DTS and SRS TruSurround (Deluxe version) to multichannel MP3 and Dolby Headphone. Visually, you can adjust video profile attributes, such as brightness and color cast, enable Pan & Scan for widescreen titles, and run dual subtitles. If you don't need DTS and SRS audio support, save $20 and buy the Standard version, which puts PowerDVD's price on par with other retail players. Reviewers hate leaving extraneous programs on their PCs, but PowerDVD is one I won't delete.

interActual Player 2.0

You won't find interActual Player on store shelves or bundled in PCs. You'll find it burned on DVD movies such as "Shrek" and "Star Wars: Episode I - The Phantom Menace." The app is a DVD playback engine that's snuggled inside Microsoft's Internet Explorer. It only works if you have an existing DVD decoder on your system. However, the extra functionality it adds is entertaining, if not riveting.

The app combines DVD-Video and online content in ways not done before. For example, when the first trailer for "Star Wars: Episode II - Attack Of The Clones" arrived, you could view it online through interActual Player with the

Player 2.0
Free
interActual
www.interactual.com

PowerDVD XP 4.0
Deluxe $69.95 (download); Standard $74.95 (retail)
CyberLink
www.gocyberlink.com

Whither DVD in XP?

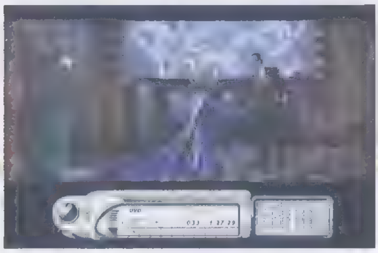
Microsoft touts WinXP as being the cat's meow in all things multimedia. So why is a basic feature such as DVD playback absent from the OS? According to David Caulton, Microsoft product manager, digital media division, the answer is economics.

"Most users will get Windows XP with a new machine that comes with a DVD codec. If they're upgrading on a machine with a DVD drive, then they will already have DVD codecs that will either work or can be upgraded to XP by the vendor for free. XP users who go out and buy a DVD drive will almost certainly get a DVD player and codecs that will work with XP. We believe that in all of those cases they've already purchased a DVD codec, and those users wouldn't want to pay for yet another one with Windows."

For XP users somehow left in the lurch who don't want to pay for a full-blown player, there are third-party DVD decoder plug-ins for only $14.95. As of this writing, Cyberlink (www.gocyberlink.com), InterVideo (www.intervideo.com), and Ravisent (www.ravisentdirect.com) offer DVD decoder packs. A fourth from National Semiconductor (www.mediamatics.com) is expected soon. Essentially, the decoder lets you play DVDs through Windows Media Player. ▲

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

"Episode I" disc loaded. Users can experience interactive screenplays or even join exclusive celebrity chat events. Chats may not last for hours like conventional audio commentary tracks do, but communicating live with stars and directors should be far more engaging. I can't recommend the player alone; it only has the barest home player-type controls to offer. I can recommend that you enjoy the discs with which it's integrated.



WinDVD
InterVideo
$49.95; ($69.95 with DTS)
www.intervideo.com

CPU CPU CPU CPU

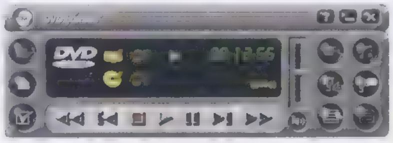
InterVideo WinDVD

Thanks to many OEM deals, WinDVD is deservedly the world's most prevalent DVD player. It uses a proprietary codec for good results. Only on a test machine with strained memory resources did I notice a trade-off between sound and video. In default mode, sound was clear, but there were frequent frame drops. With hardware motion compensation enabled, video was smooth but there were frequent audio hiccups. On a normal PC, both aspects performed normally.

WinDVD is loaded with extras. If your video hardware allows it, the app's Camera button can capture screen shots—a rare feature because DVD video data isn't held in the same memory area as regular screen grabs. Another nifty feature is karaoke-like "time shifting," which can play video from 0.5X to 2.0X speed but the sound pitch remains normal. Time shifting lets you speed up the action without the actors sounding like The Chipmunks. It's cool, but the playback jerkiness can be distracting.

Interactive's biggest claim to fame may be its breadth of audio support. Besides several two-speaker modes, there are also four-speaker, 5.1, and four varieties of Dolby Headphone, a sort of simulated surround sound. I tried all modes on a pair of $80 Koss headphones. It was a toss-up between Dolby Headphone stereo and plain vanilla stereo. A lot of the psychoacoustic settings make the sound feel hollow and distant.

WinDVD's interface is highly navigable, if not stunning. Like most players, WinDVD makes you dig through some menu screens for optimal results, but it packs in everything you could want, except perhaps 6.1 audio. For everything else, especially DTS support, WinDVD leaves you satisfied.



DVDExpress
bundled
Mediamatics/National Semiconductor
www.mediamatics.com

CPU CPU C

Mediamatics/National Semiconductor DVDExpress

DVDExpress isn't a retail product. It bundles with certain DVD-equipped PCs, such as our IBM T23. I include it here in case DVD software is a deciding factor in your choice between machines. This is a simple program with a simple interface.

Because DVDExpress is optimized for MMX-, SSE-, and 3DNow!-based processors, decent playback is guaranteed on most any platform. Two-channel and 5.1 audio are supported. DVDExpress's smooth sound and video performance pleased me, save for an odd, sometimes imperceptible pulsing in screen brightness I didn't see from other players on this ThinkPad. Save for region, parental controls, and a few display-format options, there's nothing in DVDExpress that draws attention. It's stripped down to lower a system's price point. It works, and that's about it.

Ravisent/Axeda CinePlayer DVD 4.0

The prime market for today's PC-based DVD playback may be notebooks. Home PCs are fine, but the television is just down the hall. Portability is where it's at. That said, a high resolution for current notebook displays and flawless video decoding matter more than surround sound options and many options pages. CinePlayer DVD isn't particularly deep in features, but its playback and resolution are stellar.

I tried CinePlayer using an IBM ThinkPad T23 at 1,400 x 1,050. Unlike several of the other players, CinePlayer defaults to playing video at full-screen width. I noticed no artifacting or dropped frames. I didn't observe any difference between forcing software-based decoding and allowing hardware assistance, and audio was crystal-clear. CinePlayer supports stereo or 5.1 modes.

CinePlayer DVD 4.0
Ravisent/Axeda
$49.95
www.ravisentdirect.com

CPU CPU CPU CPU

The default interface is intuitive, with large icons and mouseover titles. (The three other skins are attractive but less useful.) The Settings menus offer access to parental controls, window aspects, and more. For a shortcut, right-click the player and select from a list of player features, such as zoom and closed captions. If you want the kitchen sink, look elsewhere. For top-notch playback that won't have you fumbling around, CinePlayer may be for you.

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Kevin Savetz

Copernic Summarizer 2.0

The trouble with living in the information age is, well, sorting though all the information. Copernic Summarizer 2.0 promises to help by summarizing textual information. Feed it any text file, Word or RTF document, Web page, or PDF file, and Summarizer generates a synopsis of that document almost instantly.

As you surf, the program's LiveSummarizer tool generates synopses of Web pages that appear in a separate pane. However, the feature only works in Internet Explorer. Summarizer finds key concepts, extracting the most relevant sentences using statistical and linguistic algorithms. It works with documents in English, French, German, and Spanish.

You can tune a summary's length by choosing from 5% to 50% of the article's original length or ask for a 100-, 250-, or 1,000-word summary. (There's no way to specify other lengths, such as 500 words.) The program does an admirable job of recapitulating information. Summarizer gets to the crux of the matter, pulling out main points and eliminating unessential information, especially at the highest compression levels, such as 5% or 100 words. This often seems as simple as pulling the first sentence or two from the beginning of each paragraph, something anyone can do for free.

Summaries are usually quite understandable, but they aren't always perfect. A précis occasionally starts in the middle of a thought, a problem that can usually be solved by requesting a longer summary.

A separate pane offers a list of key concepts mentioned in the article. Clicking one of these phrases highlights the relevant words in the summarized text. When you find a particularly interesting bit of information in a summary, there's not an easy way to jump to that part of the full article for more detail. You can read a summary on-screen, then print, e-mail, or export it as a text file, Word document, HTML, or XML file. Copernic works with Windows 95/98/Me/NT/2000/XP.

In summary: pretty cool.

Summarizer 2.0
$59.95
Copernic
www.copernic.com

CPU CPU CPU

Symantec pcAnywhere 10.5

Oops, you did it again. You're on the road with your notebook, but you desperately need to use an application installed on your desktop PC. pcAnywhere lets you access your desktop from a remote location using a remote PC. You can run programs and view and edit files just as if you were sitting at the desktop. The program lets you connect to the PC by dialing into its modem or connecting via the Internet, a LAN, or a direct serial connection.

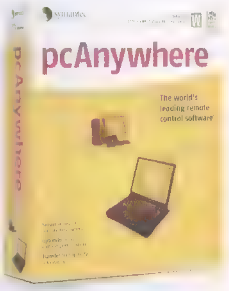
Overall, the program works as advertised. After a bit of a learning curve, you can run programs and transfer files between your computers. However, pcAnywhere contains some features that seem unnecessary for most users, such as automated file transfers and recorded sessions for playback later.

This version of pcAnywhere does add features for security-minded users. Enhanced logging informs managers of unauthorized access attempts, such as those from unauthorized IP addresses, and the Host Assessment Tool checks your configuration for security vulnerabilities.

The new version also drops a handful of features. File transfers are no longer scanned for viruses, and Banyan and IPX protocol support has been eliminated, as has support for Windows 3.1. If you need one of these arcane features, an older version of pcAnywhere is also included on the CD.

pcAnywhere's host and client modules run on Windows 9x/Me/NT/2000/XP, but there isn't compatibility with XP's Fast User Switching option. A PC running one platform, such as Windows 95, can connect to and control another platform, such as XP.

Other remote-access applications may suit you better. Virtual Network Computing (www.uk.research.att.com/vnc) is free, easier to use, and supports access from Mac OS, PDAs, and other non-Windows computers, but it lacks pcAnywhere's advanced security, encryption features, and file transfer capabilities.



pcAnywhere 10.5
$179.95 ($99.95 upgrade)
Symantec
www.symantec.com/pcanywhere/Consumer

CPU CPU CP

CPU Ranking: 0 = Absolutely Worthless CPU CPU CP 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Kevin Savetz

Microsoft Office v. X

Office v. X
$499.99 ($299.99 upgrade from Office 2001 or Office 98)
Microsoft
www.microsoft.com

CPU CPU CPU CPU

When Microsoft wants to do something right, it does it right. Office v. X, or Office for Mac OS X, is a stable and feature-filled productivity suite. The suite is so good I think I can finally find in it my heart to forgive the company for the travesty that was Word 6 for Mac.

Office v. X is not exactly a revolutionary update—its features are very similar to Office 2001, the version for Mac OS Classic. Although there are some notable additions to the suite, the meat of the new version is the suite's compatibility with OS X. Along with that comes a sleek Aqua interface and support for OS X's special features such as the Quartz drawing layer. For example, Excel charts can include transparent elements and anti-aliased text. The suite looks and feels like an OS X application, not a hasty port.

You'll find some of the suite's most notable changes in Entourage, Office v. X's sweet e-mail client/calendar/contact manager application. Entourage sports a redesigned interface, better editing tools, and an improved calendar/task manager. In short, you couldn't ask for much more from an e-mail client. Entourage supports multiple accounts and powerful filtering tools, and it is rock-solid stable, even if you have thousands of messages in your deleted messages folder. A persistent bug wouldn't let us print e-mail, however.

Word and Excel in Office v. X are largely unchanged from Office 2001, but there is a smattering of minor enhancements. The ability to select multiple, noncontiguous sections of text has been added to Word, as has a tool to quickly clear text formatting. The Live Word Count feature makes a writer's life easier by keeping a document's length on-screen at all times. Excel finally, *finally* includes a calculator, a feature that has been sorely missing since version 1.0.

PowerPoint, the suite's presentation software, includes a number of welcome additions, including text that automatically fits into allotted space and the ability to save presentations as QuickTime movies. Transparency lets you overlap objects, making your presentations prettier (or maybe just really hard to read).

Office v. X also makes it easier to share files. Each program's file format is now compatible with Windows versions, letting Mac users share files without saving in special formats to accommodate their Windows-using associates. The programs can also read AppleWorks 6 documents. However, the programs can't save files in that format.

Office v. X also wins points for the features it lacks. Absent in the Mac Office edition (but present in the Windows XP version) is the controversial product activation feature and the equally controversial Smart Tags feature, which adds links to Web pages.

The package also includes MSN Messenger, an instant messaging client (which you can also download free at messenger.msn.com). This is one spot where Mac users get the short shrift: Messenger for Windows XP is far more robust. The Mac version doesn't offer audio or video chat, a whiteboard, or application sharing. However, Messenger is nicely integrated with the rest of Office. The Notifications feature works with Microsoft's .NET Alerts service; Notifications can remind you of an appointment or tell you when your favorite company's stock has tanked.

The suite's drag-and-drop installation process couldn't be easier. The installation disc also includes an easy-to-miss value pack, which includes lots of fonts, clip art, document templates, and annoying animated help assistants.

Like OS X, Office v. X has some hefty system requirements, including a minimum of 128MB of RAM and up to 160MB of drive space. There are hefty budgetary requirements to consider, too. The suite costs $500. If you don't need the whole enchilada, Word, Excel, and PowerPoint are each sold separately for $399 (or $149 for each upgrade). But you can't get Entourage, arguably the best part of the deal, separately.

Microsoft did a fine job with Office v. X. There's little to complain about, unless you just like to gripe about the company's very existence. The package just might turn your Mac OS X partition from an interesting curiosity into an environment where you can actually get some work done.

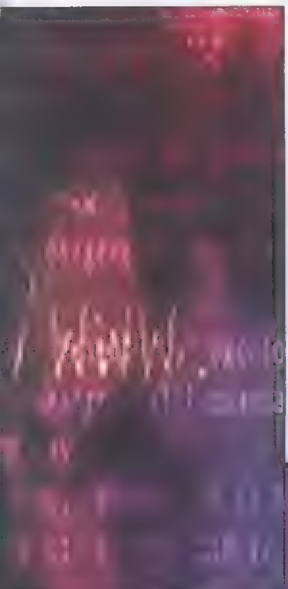
Office v. X also makes it easier to **share files.** Each program's file format is now **compatible with Windows versions,** letting Mac users share files without saving in special formats to accommodate their Windows-using associates.

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Chris Pirillo

That'll Teach Me

Chris Pirillo is a geek in every sense of the word. When he's not distributing technology tidbits on Lockergnome (www.lockergnome.com), he's hosting "Call forHelp" (www.callforhelp.tv) on TechTV. Chris is also a motivational speaker; he drinks coffee to slow down. He enjoys digital photography, designing Web sites, and walks on the beach.



I have a problem. I mean, I'm the kind of guy who will spend two hours tweaking my system so I can launch my applications two nanoseconds faster. It just doesn't make any sense to my close friends and loved ones. This speed addiction drove me to the brink of insanity the other day. Or, night, as the case might be.

It all started when I heard about this clever little application a clever little company created: IAA (Intel Application Accelerator). According to Intel's online documentation, IAA "reduces the storage sub-system bottleneck, enabling the processor and other system level hardware to be to be more productive and efficient." Once installed, it would presumably improve disk I/O operations and shave my boot time. Works with WinXP? Sounds good to me.

Just then, a little voice in my head started to chirp. "Chris," it said, "you probably want to back up your system in case this thing doesn't work like it says it will." Bah! Whatever. In my tweaking and eking, I turned off WinXP's much-touted System Restore feature. Can't have rogue processes running now, can I? Regardless, IAA installed without a hitch. My system rebooted without a hitch. Then, I was greeted by the all-too-familiar New Hardware Wizard. Windows was no longer detecting my CD-RW drive as a CD-RW drive. Oops.

> **Then, I was greeted by the all-too-familiar New Hardware Wizard. Windows was no longer detecting my CD-RW drive as a CD-RW drive. Oops.**

WinXP's integrated CD-burning features were not working properly anymore. Uninstalling (and subsequently reinstalling) IAA had no impact. Whatever that software did, I couldn't reverse. I was frustrated with the situation until someone e-mailed me a tweak—then I became even more confused. When I first read Lockergnome subscriber Chris Bingel's message, I thought he was two fries short of a Happy Meal: In response to your 'Invalid Function' error, I experienced the same thing with my digital camera. What I discovered is that if you right-click to bring up the context menu of the drive; don't click on anything (clicking Open from the context menu will bring about the 'Invalid Function' error again). Instead, click away from the drop-down menu and then double-click on the drive to open it. It should perform as expected.

Laugh all you want. This workaround worked. However, Windows still wouldn't allow me to burn a CD like it did before I installed IAA. Ahead Software's Nero Burning ROM still worked flawlessly, so I didn't lose too much sleep over the glitch. Yet. You see, I have a DVD-ROM in my system, as well. I had to wait a few weeks for CyberLink to release its (very powerful and very recommended) PowerDVD XP application. When I had the chance to install it, I inserted "Planet of the Apes" (the movie, not the planet). PowerDVD gave me an error. OK, must be the disc. Let's try "Star Wars: Episode I - The Phantom Menace." No go. Perhaps this software doesn't like Fox flicks? When Tim Burton's "The Nightmare Before Christmas" wouldn't load either, I started to panic.

Remembering my earlier troubles with CD-RW, I made an educated guess and pointed my finger at IAA (and you can guess which finger that was). There was only one thing left to do: reinstall Windows. I stayed up all night completing the task, but at five in the morning, I was vindicated. Every piece of software had been reinstalled—except for that blasted IAA. Shell-integrated CD burning? Back to normal. Playback of those DVDs? Smooth as silk. Frustration with Intel for releasing its Application Accelerator? Boundless.

If you've never had a problem with IAA on your system(s), then you probably think that my tale of woe is an isolated incident. Unfortunately, it isn't. There are quite a few knowledgeable users who have (or had) issues with this "performance software package." I triple-checked the necessary requirements before installing the utility; I followed the instructions to the (drive) letter; I pushed the envelope and it pushed back. And yes, I have already admitted to not backing up the operating system, but that didn't make IAA any less buggy (on my computer, at least). I expected—or assumed it would be—a better product, especially since it was developed at Intel. That'll teach me. ■

You can dialogue with Chris at chris@cpumag.com.

by Pete Loshin

Networks For Nothing, Software For Free

Pete Loshin, former technical editor of software reviews for BYTE Magazine (print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.

A top 5 reason for SOHO LANs? To share broadband Internet! SOHO LANs pop up anywhere a desktop and laptop regularly bump against each other. And prices for network stuff keep plummeting. Five years ago $300 got you a PCMCIA fast Ethernet card (100Mbps). That amount can now outfit a 5-node SOHO LAN: switch ($40), PC cards ($60 each) for two laptops, NICs ($10 each) for three PCs, and a broadband firewall/router ($100).

Thinking about Windows? That's $500 more to upgrade to network-friendly WinXP Pro instead of Home Edition, not to mention hardware upgrades for older PCs. No technical reason to upgrade them all, but using one OS pleases users and eases support. (Not convinced? Try installing Win95 on a new PC.)

There's better computing through open source.

Dig those old, obsolete boxes from your [own | friends' | family] [basement | attic | barn | closet] and turn them into X terminals with a *NIX-like OS for a few bucks apiece. How? Easy:

1. Get terminals/PCs working with enough RAM and hard drive to boot Linux (16MB to 32MB RAM, 300MB+ drive), plus NIC, video card, monitor, floppy or CD drive.
2. Install basic Linux configuration on the terminals.
3. Use your most powerful desktop as a server with a full Linux install. Set up accounts for all users.
4. Plug it all together, and make sure of connectivity.
5. Configure X Windows so terminals display programs actually being run on the server.

Upgrade the old things? That way madness lies. Just use them for basic browsing or simple apps.

Need details? Look to the usual Linux Web sites (start at www.yolinux.com) for answers. Problems? Again, the usual Linux resources will tell you everything you need, from which distros to use to how to install Linux over the LAN (and save on CDs).

The only remotely tricky step is No. 5. Most sites only cover setting up X Windows on standalone systems. We want our terminals to execute programs on the remote server and allow the server to write to the terminal's screen. Check out the "Remote X Apps mini-HOWTO" at www.xs4all.nl/~zweije/xauth.html for details.

On those bare-minimum terminal PCs, users log directly into the server, and everything (except for the display) happens there. Programs run there; files are stored there. If the terminal you're using blows up, your data is safe on the server. You can access it from another terminal or the server console.

Though obsolete old systems can save big bucks, they may lock you into using your oldest, most obsolete system as your lowest common denominator. If the best "universal" desktop on your LAN sports a 640 x 480 monitor and 256 colors, other terminals may have to use that configuration, too.

Upgrade the old things? That way madness lies. Just use them for basic browsing or simple apps. If they're not useful, at least they haven't cost much.

Best for the SOHO LAN are those obsolete-for-Windows PCs that still work with Linux. Got a 133MHz+ CPU, 64MB+ of RAM, and 1GB+ hard drive? That's too much horsepower for a dumb terminal but plenty for office apps, mail, and Web browsing. Let the kids use one for homework, stick one in the kitchen, den, even the guest room so guests can check their investments and mail.

Next, set up file and printer services on your server so those standalone PCs don't stand alone for storage and output. Configure all systems to use the server for all storage and automatic backups will save everyone's hide sooner or later. (*WARNING: Run, store, and test your backups appropriately or be disappointed.*)

You can use the same PC as a desktop and server, but you may not want to on a busy LAN. Instead, build a killer PC, minus big hard drives (10GB should be plenty for gaming and personal programs). Then, use scripts on the server to run the programs you don't want to waste local disk or cycles. Run remotely, display locally. Install once, use anywhere.

So, why just share a broadband connection when you can do some serious networking? ■

Get saucy with Pete at opensauce@cpumag.com.

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Now available in six natural colors.

If ordinary CDs put you to sleep, consider this your wake-up call. Because we've created a line of recordable discs in the most radiant colors you've ever seen. Unlike other brands, our CDs are infused with permanent dyes—not sprayed with a coat of paint. For a closer look, stop by memorex.com. Because these brilliant CDs surpass other discs with, well, flying colors.

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Words From The Web

Yeah, they *actually* said this . . .

"Tongue piercing looks really painful and sore."
From a Malgoo message board

"Homer and Bart have their own cereals now. Doh!"
From an MSN message board

"I am tired, and my contacts are crunchy."
From an MSN computers chat room

"Good thing that urinating in public is not on my top 10 list of things to do. . . ."
From an MSN message board

"My hair sucks in Florida."
From an AOL Town Square chat room

In the spirit of April Fools' Day, we've tossed in a story that just isn't true. See if you can spot the one we made up.

Demise Of The Dot Coms

Web sites were dropping dead faster than cows in a slaughterhouse in 2001, according to Webmergers (www.webmergers.com), a research company for buyers and sellers of Internet properties. Webmergers estimates 537 Web sites filed for bankruptcy or closed their doors in 2001, more than twice the number of Web sites that took a dirt nap in 2000. In fact, the year 2001 was the worst for Web sites since the word "net" still evoked images of fishing and basketball.

May and June of 2001 were the worst months for Web site failures, with 62 Web sites ceasing operations in May and 61 closing shop the following month. However, Webmergers believes that most of the Internet pretenders have already shuffled off the Web because the "death rate" for Web sites has decreased recently. Only 21 Web sites shut down in November 2001, and in December 2001, the Web saw the least number of closings since August 2000.

The large number of failed Web sites in 2001 shouldn't be interpreted as an implosion of the Internet, however. Webmergers estimates that between 7,000 and 10,000 Internet companies are still receiving funding and in operation. The report states that "to say that the decline in shutdowns is because there are no dot coms left is a bit like saying a decline in rabies rates is due to the fact that all the dogs are dead." So we still have plenty of Web site closings to look forward to. ▲

Infinite Loop

Web Sites Of The Rich & Famous

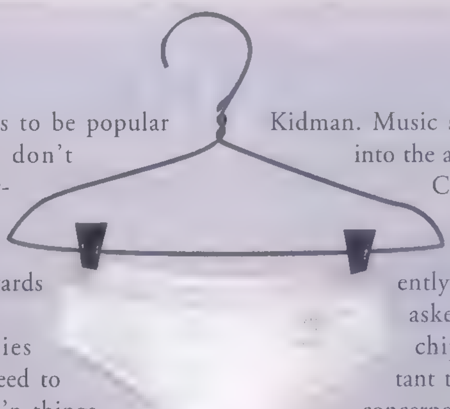
A month-long Web site traffic survey taken last year revealed that people visited provocative online celebrity Danni Ashe's site about 59,023,000 times in a single month, according to BillionDownloadWoman.com. Here's how some other celebrities fared.

Celebrity	Page Views
Martha Stewart (www.marthastewart.com)	33,373,000
Oprah Winfrey (www.oprah.com)	21,777,000
Britney Spears (www.britneyspears.com)	20,346,000
Cindy Margolis (www.cindymargolis.com)	3,947,000
Cindy Crawford (www.cindy.com)	2,191,000
Faith Hill (www.faithhill.com)	944,000
Madonna (www.madonnafanclub.com)	570,000

Surprised? One word that might ease your mind: recipes.

by Michael Sweet

Celebrity Skivvies



Internet auctioneer eBay recently announced that on April 28, it would begin the sale of celebrities' undergarments to raise money for charity (no word as to whether the undies will be new or "slightly used"). Each undergarment is to be autographed by the celebrity who owns the item, and the money raised will be divided among several charities, including the Red Cross, America's Promise, and the National Internet Youth Council. The underwear drive is scheduled to last through the spring, although a spokesperson for eBay said the fundraiser might continue into the summer if it proves to be popular (and if celebrities don't stop wearing underwear, which is entirely possible if you've seen any awards shows lately).

Several celebrities have reportedly agreed to donate their draws 'n things to eBay. The celeb list includes notable movie and TV stars such as married couple Brad Pitt and Jennifer Aniston, Richard Gere, Halle Berry, Pamela Anderson, Jack Black, and Nicole Kidman. Music stars are also getting into the act, with divas Mariah Carey and Jennifer Lopez donating to the cause. Apparently eBay has repeatedly asked Britney Spears to chip in, but she's hesitant to do so because she's concerned that parents of her younger fans would see it as inappropriate. Instead, she's offered to donate several items of clothing she wore on-stage during her most recent tour. ▲

Raising Your Glass & Money

Young Web entrepreneurs developed a taste for the finer things in life before their stock options evaporated like water on a hot skillet. And what could be finer than a nice Bombay Sapphire Martini? Although those entrepreneurs are likely drinking out of paper cups these days instead of designer martini glasses, they (and you) can design your own funky martini glass at www.asexpressedbyyou.com. Bombay Sapphire sponsors the site. The company is donating 10 cents for every glass designed to the Worldstudio Foundation, a foundation that gives scholarships to disadvantaged design and architecture students.

You'll have a wide variety of backgrounds, stems, bases, tops, and animations from which to choose when you create your martini glass. The tools are easy to use, and I enjoyed experimenting with the different options. You'll begin by choosing a background for your design. Next, choose a base for your martini glass, followed by a stem and then the top of the glass. You can also drop a couple of olives or an umbrella in your creation which I thought was a great touch. After you create your design masterpiece, you can send it to friends or submit it to the gallery. Some of the designs are very cool, evoking the spirit of lounge culture. ▲

TIME WASTERS

At Least She's Not Christine

Why do we give our cars nicknames? I don't know, but I've known some great vehicle nicknames over the years, including Lurch, The Golf Ball, and The Big Phat Hoopty.

If you're into cars, or if you listen to National Public Radio, you've probably heard Car Talk, a show about cars hosted by Click and Clack, also known as Tom and Ray. Like any good show, Car Talk has its own Web site (cartalk.cars.com), and tucked away in one dark corner of the Web site is a fun little time waster called Name Your Heap.

Simply enter a little information about you and your car, and Car Talk will christen it.

You have to enter your first name; the car's year, make, and model; the car's color; and its gender. (If you think cars don't have a gender, you don't know a K-car from a '69 GTO Judge.)

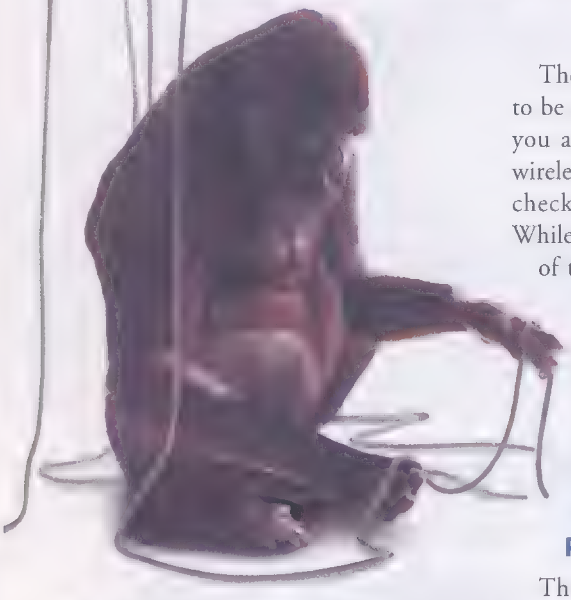
I used Name Your Heap to name the vehicles of several editors in our office. Here are some of the monikers it generated: Rosetta the Atrocious Behemoth, Ingrid the Jouncing Mobile Sore, Drusilla the Useless Remains, and Candy the Sleazy Loser. My red sports car shall forevermore be known as Celeste the Deranged Mound. ▲

If you find a strange, interesting, or funny Web site in the course of your Internet travels that you think is worthy of Fringe, send your suggestion to fringe@cpumag.com

If you guessed the „Celebrity Skivvies" piece was too good to be true, you guessed right. You can log off of eBay now.

Wireless Guerrilla Networks

Hitchhiking On The Information Superhighway



Who says there are no free rides? Next time you are in Manhattan with your notebook and a Wi-Fi wireless network card, go directly to Tompkins Square Park. (That's Avenue A between 7th and 10th Sts., for you rubes.) Sit on any park bench, boot up, and open your browser. Odds are you will find yourself surfing the Web at surprisingly high broadband speeds . . . for free. If you are in Portland, try the same routine in Pioneer Square, one of the landmark public spaces in the downtown area. No ISP, no overpriced broadband fees, and no joke. You have just stumbled upon one of the hottest new urban tech trends: free wireless Web access.

Just when it seemed that the Web had become boring or just fully leased by AOL and Microsoft, a hearty but loose confederation of techies, coders, Web idealists, and even urban planners and "information anarchists" is making the Internet interesting again by giving away some of its own bandwidth. These second-generation Web pioneers are creating networks of free wireless access points in major cities worldwide: over 25 nodes in New York City, 18 in Portland, and 20 in the San Francisco Bay area.

The coverage is spotty in these cities, to be sure, but if you know where to go, you and your Wi-Fi-enabled (802.11b wireless) notebook or PDA can jack in, check e-mail, and surf at high speed. While these are among the most evolved of the ragtag networks of free wireless coverage, similar groups now exist in Denver; Boston; London; Brisbane, Australia; and even Mentor, Ohio and elsewhere. (See the "FreeJack: Where to Plug In" sidebar.)

You Connect The PVC To The Pringles Can, Then . . .

The technology involved in creating these public access nodes is at once disarmingly familiar and madcap. According to Anthony Townsend, co-founder of NYCwireless, most of his volunteers start with off-the-shelf technology: an 802.11b access node/Web gateway, wireless network cards, and a broadband ISP account. The typical node is set up in a member's apartment that is adjacent to a public space, and without any add-ons, a wireless access node can broadcast its Wi-Fi signal up to 100 yards in any direction. Each city's wireless group hosts a Web site that includes city maps of the available nodes and any special network settings required so that anyone in the immediate area can hitchhike on that node.

Moving beyond the basics is where the fun starts and where networking guerrillas reveal their inner geek. In order to create wider coverage from a node, some hosts employ various types of antennae that focus and extend the signal into a narrower, longer 40-degree to 50-degree cone of coverage. Some hosts just go out and buy a $50 to $225 stock directional antenna, but many others take special pride in constructing low or no-cost, homemade models out of random objects. These antenna projects have become one of the strange, obsessive hobbies associated with the community networking movement, and they can involve anything from brass toilet overflow tubing and scrap metal to a handful of metal washers, PVC tubing, and a Pringles potato chip can (total cost: $6.45).

Low Tech, High Ideals

Why do these wireless freedom fighters do what they do? Like any guerrilla army, their goals and motives vary among and even within some of their organizations. The phenomenon hasn't even settled on a consistent label. Guerrilla networking? The free wireless movement? Wireless community networks? City-wide networking? The terms are as much in flux as the ideologies. "I'm increasingly obsessed with pushing more bits further and faster for less cost," says tech hacker Rob Flickenger in his instructions for turning a Pringles can into

When it comes to making directional antennae for wireless access nodes, the stranger and cheaper the better. This hot rod melds PVC tubing with a Pringles can for a total cost of less than $7.

Illustration: Andria Schultz

an antenna. (For full specs on the Pringles projects, see www.oreillynet.com/cs/weblog/view/wlg/448.) Many like him just want to see what the technology can do. Like the custom car hot rodders of the 1950s, these hobbyists boast about how cheaply they can throw a Wi-Fi signal into their neighborhood or how they retrofitted an old Primestar satellite dish into a line-of-sight directional antenna that transmits a broadband signal for 10 miles at full bandwidth (although those pesky tree leaves do diminish the signal, the designer admits).

While some are obsessed with making the most of low-cost, low-tech solutions, many others are in this game for the lofty concepts. Adam Shand, founder of Portland's PersonalTelco, sees free wireless Web access as just the first stage of a more powerful grassroots "city-wide network" that lets people within an urban space maintain contact with one another, their work, and their home anywhere, anytime. And the cause runs even deeper. "It's *how* we build it that's important to us," says Shand. "The idea is that we use all open-source software. There is no corporate or governmental ownership of the project. It is all community-owned." For this wing of the movement, this is all about preserving what they see as an Internet spirit that preceded its commercialization, the free exchange of ideas among individuals. "I think the whole idea of preserving the end-to-end paradigm is very important," says Shand.

The community wireless movement may be one of the last few high-tech enclaves where revolutionary zeal survives. Many of the serious thinkers in this subculture propose something like an alternative communications system that circumvents traditional governmental and commercial institutions. Another highly evolved wireless networking group, SeattleWireless, is looking beyond the Internet altogether. "The goal is to create a self-sufficient network that does not depend on the Internet for content or connectivity," says Kenneth Caruso, one of the group's organizers. "We do not require that nodes have access to the Internet. We really want nodes to connect to other SeattleWireless nodes so the network will expand." By creating a local network apart from the Internet and not being hobbled by the speed of the ISP shared by any one node, users will be able to exchange information with neighbors or across town to offices and schools at full Ethernet network speeds.

Wireless Urban Renewal

For Townsend, who teaches urban planning at New York University, free wireless is about nothing less than using cutting-edge technology to restore vibrancy to public spaces and even a neighborhood ethic to the postmodern city. "A big motivating force is to do this before commercial providers take over the airwaves of our public parks, to stake a claim that this is going to be free to the public and run by volunteer organizations. Our group reflects this tradition of being custodians and in keeping open spaces noncommercial."

Commercial wireless providers envision when location-specific ads and e-commerce opportunities pop up on your handheld in any given neighborhood. "City guides are great if you want to get drunk or eat," says Townsend. But what if you need to find the nearest hospital or bus stop? These are the noncommercial information services he thinks should be provided for the community by the community.

Lower Manhattan is among the most active free wireless areas in the world, with more than a dozen nodes available within a radius of several miles.

In an upcoming partnership with the Bryant Park Restoration Corporation in Manhattan, NYCwireless will have the

FreeJack: Where To Plug In

Most major U.S. cities have some sort of community wireless project in the works, but they aren't always easy to find. Here are a few of the major hubs of activity online and home pages for the largest active communities.

Free Networks

www.freenetworks.org

Start here. This is the most comprehensive clearinghouse for community wireless news and links to local sites and technical information.

NYCwireless

nycwireless.net

The well-stocked home site for the New York area group is both a repository of general wireless info and good links to the mountain of recent press coverage. It's also a directory of available nodes and their settings throughout the city.

SeattleWireless

seattlewireless.net

One of the more active and comprehensive community networks has loads of FAQs, mission statements, node maps, and even a store with branded merchandise.

NoCatNet

nocat.net

This hub for Sonoma County, Calif. is also where some of the software specs for community wireless applications are being hashed out. This site is good for techies.

Guerrilla.net

205.159.169.11

With a goal of creating "a networking fabric outside of governments, commercial Internet service providers, telecommunications companies, and dubious Internet regulatory bodies," this site is at the extreme edge of the wireless networking movement. It also hosts some of the best collections of basic instructions and resources for users wanting to construct their own wireless networking node.

airwaves within that famous hub of neighborhood activity wired 24/7. Wireless users who boot up in the park will be greeted by a co-branded Web page that will access community calendars and the Web. This approach may help neighborhoods reassert their identity and unique flavor at a time when many urban spaces are becoming homogenized. Organizers hope the local office drones will emerge from their cubicles to do more serious work in the park. "It could revitalize the street and the park," says Townsend.

Start The Revolution Without Us?

To be sure, the philosophies attached to guerrilla wireless networking are more evolved than the networks themselves at this point, many of which only started in 2001. Like all revolutions, this one has its share of obstacles to vault before changing the world. For instance, wireless networks are only beginning to deal with security and liability issues, who can see what on whose computers, and who is responsible for what an anonymous surfer accesses via a local node. (See the "Legal Schmegal!" sidebar.)

Some of these issues will be solved by (you guessed it) more technology. Community wireless groups, such as NoCat in Sonoma County, Calif., are working on "captive portal" software designed to bring discipline and accountability when any wired passerby jacks into your neighborhood node. A captive portal will greet users with the node's home page and it can allow them different levels of access to the system (all encrypted, of course). This captive portal may also require users to acknowledge a user agreement about keeping their Web activities legal while visiting the node. At some point, the owners of the node also may need software that reserves some of the general bandwidth for their own use.

Some free access node hosts put their access points outdoors in an effort to extend the signal farther. Here are plans for sending power and a network signal into a Wi-Fi card housed in Tupperware.

As the local network plans become more ambitious, and hackers experiment with broadcasting more powerful signals, the community wireless movement will have to contend with two obstacles that are less susceptible to software solutions: building owners and radio frequency regulators. Townsend's initial attempts to interest public facilities such as Penn and Grand Central Stations in wiring their airspace came up empty. It may take a while to convince real estate companies that wireless networking is as much an essential public resource as water and electricity, so NYCwireless is going to try for the libraries next. Meanwhile, some node masters are chomping at the bit to increase their range with more advanced signal amplifiers. This is where a quaint grassroots movement may butt up against the Federal Communications Commission, which governs any broadcasting that has much more than one watt of power.

But the greatest challenge to community wireless may be the oldest: human nature itself. As any political third-party organizer or community activist will tell you, grassroots movements *sound* great to just about everybody until it is time to pony up time, money, and resources. It isn't easy getting volunteers interested and then committed to sharing bandwidth and building a network cloud one block at a time, says Shand. His group has 400 subscribers to its e-mail list, but "most of the work gets done by a small core of a dozen people. The whole problem is there is no reason to contribute to the network until the network is useful," he says. NYCwireless has 28 nodes representing as many volunteers, but this is a slim ratio for a city of many millions and an organization that has received reams of news coverage in the last six months. In order for these wireless communities to grow beyond offbeat fodder for the local press, they will have to convince more broadband users, perhaps like you, to plug that Web gateway at their feet into an empty Pringles can. **CPU**

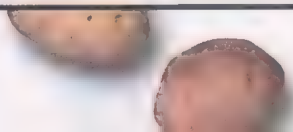
by Steve Smith

Legal, Schmegal!

Nothing sells like controversy, so it isn't surprising that most press coverage of the community networking movement focuses on potential legal obstacles to erecting a volunteer Web-sharing network. According to broadband customer user agreements, for instance, fat-pipe users are not supposed to be sharing their Internet access. Bah, says NYCwireless' Anthony Townsend. "It's not illegal, but it is a breach of contract, so they could shut you off."

So far, the high speed providers have had little to say about this. And for some of the companies that free wireless access could most hurt, the wireless telcos, community networks are more of an interesting testbed for their own commercial plans. "We are not a threat," Townsend adds. "If anything, we are educating people about the technology."

While node owners may need to protect themselves against abuse, illegal uses of the Web, or passersby glomming bandwidth, Adam Shand of Portland's PersonalTelco says, "The sharing bandwidth issue is entirely fabricated by journalists." In real-world use, most people log on to a community net briefly to check e-mail or download a file, so that sharing a connection has made no noticeable difference in overall use on these free nodes. Moreover, the broadband companies haven't uttered a word about it . . . at least to Shand's group. "There is not a single incident of an ISP complaining, except in articles by journalists," he insists. ▲



Coder's Corner: XML

Dialects Of XML:
XHTML & Beyond

In Coder's Corner: XML, Ian Graham shows you how to program with XML. Ian is the author of numerous books pertaining to Web development, including "The HTML Sourcebook" and "The XML Specification Guide."

Last month we covered XML's popularity as a tool for universal data modeling and transport. This month we look at examples of XML languages designed to display information and the XML namespace mechanism that mixes them together.

Common XML dialects for data include XHTML, MathML (Mathematics Markup Language), SMIL (Synchronized Multimedia Integration Language), and SVG (Scalable Vector Graphics). Each has a specific role and is defined by a formal specification. The W3C (www.w3.org) defines these dialects. You can find the specifications at www.w3.org/TR.

Defining XHTML

XHTML recasts HTML to yield a next-generation language consistent with XML's syntax rules, which has many advantages. First, XML's stricter rules make it easier to manage data because it's easier to detect coding errors. Second, you can process Web pages using XML tools. Most importantly, you can mix XHTML with other XML dialects (more on this later).

XHTML adds five syntax requirements to HTML, including:

- All XHTML element or attribute names must be lowercase, such as <a href="...">.
- You can't omit end tags of XHTML elements. For example, you would write: <p>This is a paragraph.</p> <p>And another paragraph.</p>.
- For XHTML elements without corresponding end tags, you must use special empty-element tags, such as <link rel="stylesheet" href="..." /> or <br />.
- All XHTML attribute values must be in quotes such as <pre rows="5">.
- All XHTML attributes must take values (some HTML attributes don't have values). You would write <option selected="selected">.

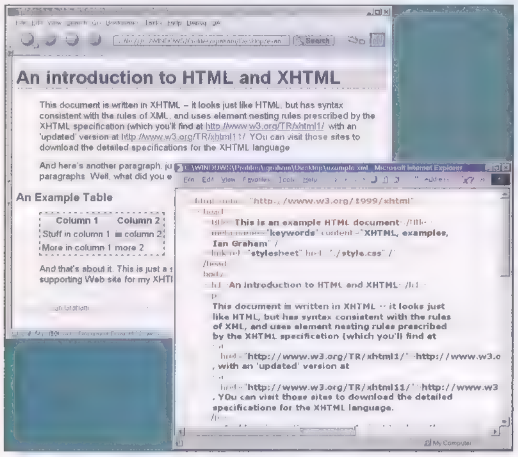
You must also indicate that the tags come from XHTML via a special mechanism called a namespace identifier. This is defined on the html element of an XHTML document using an xmlns attribute. For example: <html xmlns="http://www.w3.org/1999/xhtml" >.

The xmlns attribute identifies the namespace name (such as a URL) associated with the html element. This attribute essentially says the html element (which has the xmlns attribute) and the elements inside it all come from the XHTML space of names. In XML, every language *must* have its own namespace identifier. The XHTML specification formally states that "http://www.w3.org/1999/xhtml" is the namespace identifier for this language. Consequently, a complete XHTML document might look like:

```
<html xmlns="http://www.w3.org
/1999/xhtml">
   <head>
      <title> This is an example HTML
   document </title>
      <link rel="stylesheet" href="./style
      .css" />
   </head>
   <body>
   .
      .
   </body>
</html>
```

This document uses a link element to reference a style sheet and anchor elements (not shown) to link to other documents. Note that the *meanings* of "a" and "link" elements are intimately tied to their being XHTML names. That is, another language may also have a link element, but it may mean something different.

You can use XHTML like HTML, creating an XHTML document and saving it with a name such as example.html. When a browser downloads the document, the browser thinks it's HTML and processes it with a HTML engine.



An introduction to HTML and XHTML

This document is written in XHTML – it looks just like HTML, but has syntax consistent with the rules of XML, and uses element nesting rules prescribed by the XHTML specification (which you'll find at http://www.w3.org/TR/xhtml1/ with an 'updated' version at http://www.w3.org/TR/xhtml11/ YOu can visit those sites to download the detailed specifications for the XHTML language

An Example Table

Column 1	Column 2
Stuff in column 1	column 2
More in column 1	more 2

```
"http://www.w3.org/1999/xhtml"
    This is an example HTML document
    "keywords" content="XHTML, examples,
    Ian Graham" /
    "stylesheet"  "./style.css" /
    An introduction to HTML and XHTML
    This document is written in XHTML -- it looks just
    like HTML, but has syntax consistent with the rules
    of XML, and uses element nesting rules prescribed
    by the XHTML specification (which you'll find at
      "http://www.w3.org/TR/xhtml1/"  http://www.w3.o
    , with an 'updated' version at
      "http://www.w3.org/TR/xhtml11/"  http://www.w3
    . YOu can visit those sites to download the detailed
    specifications for the XHTML language.
```

This example shows how the Mozilla 0.9.7 browser (top left) and Internet Explorer 5.5 (bottom right) render an example XML document differently.

You can also save the file to indicate XML use, such as example.xml. When a browser downloads the file, the Web server indicates the XML data. The browser displays the file with its XML engine, using the namespace attribute value to decipher the XML data and decide how to display it.

Presently, only Mozilla and Netscape 6 and higher can recognize XHTML properly. Opera 6 supports this partially. Internet Explorer 5.5, for example, would display the document as a tree of XML data.

Edit & Manage XHTML

Most HTML editors don't support an XHTML mode. Dave Raggett of the W3C, however, has developed the open source tool HTML Tidy. It takes any HTML document and produces better HTML or well-formed XHTML. HTML Tidy is available as a standalone or helper component for several HTML editors at http://tidy.sourceforge.net.

The advantage of using XHTML over HTML comes when you mix different XML dialects in the same document. For example, you can use XHTML for regular text content, MathML for mathematical expressions, SMIL for multimedia components, and so on, all in the same file, and you identify the different parts using the namespace identifier.

You can do this several ways. The following example illustrates the simplest. It shows an XHTML document with a piece of MathML in the middle. To show it, we put an xmlns attribute on the math element that starts and contains the MathML chunk (in bold). This attribute overrides the xmlns attribute at the document's beginning, essentially saying: From here on, every element by default comes from the MathML space of names, and not from XHTML:

```
<html xmlns="http://www.w3.org
/1999/xhtml">
  <head>
 <title> XHTML with Embedded
 MathML</title>
  <style>
math { margin-left: 2em; border: 1px solid
   black;
     padding: 0.3em; font-size: 120%;
     font-family: garamond; }
 </style>
 <link rel="stylesheet" href="./style.css" />
</head>
<body>
<h1>XHTML with Embedded
   MathML</h1>
<p> This document is written in HTML,
   but also has MathML embedded within
   it. Here, is an example:
</p>
<math xmlns="http://www.w3.org/1998
   /Math/MathML" >
 <mi>f</mi><mo>(</mo><mi>x</mi>
 <mo>)</mo>
 <mo>=</mo>
 <msubsup>
 <mo>&#2211;</mo>
     .
       .
   <msup><mo>)</mo> <mi>n</mi>
      <msup>
</math>
<p>And here's another paragraph, just to
show . . .
      .
 </body>
</html>
```

This means we can use XHTML for text and MathML for mathematical expressions or equations. The browser uses the namespace attributes to figure this out. This is what the Mozilla browser does if you have downloaded a MathML-enabled version to render the embedded mathematical expressions as nicely formatted equations. Mozilla's code understands how to format the MathML namespace data. The browser routes the data to the MathML renderer, which displays the content.

For a elegant alternative, we can use xmlns attributes to associate namespace prefixes with specific namespaces. For example, by starting with:

```
<html xmlns="http://www.w3.org/1999
     /xhtml"
   xmlns:m="http://www.w3.org/1998
     /Math/MathML">
```

we're saying that inside the html element every element name by default comes from the XHTML space. However, any element or attribute name with the *prefix* m: in front comes from the MathML namespace.

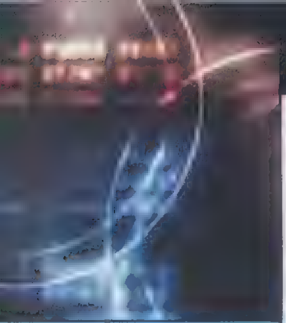
In this case we'd need to change the document, remove the xmlns attribute from the mathml element, and add the prefix m: in front of all of the MathML tags. Using this approach you can intermingle as many XML dialects as you want, assigning each its own unique prefix. This is easier to use than the preceding mechanism, particularly if you have a lot of non-XHTML "chunks" in your XHTML document.

(NOTE: Full examples of the documents described in this article are available at www.smartcomputing.com/cpumag/apr02/xmlexamples or at www.utoronto.ca/ian/articles/feb02-1/.) CPU

by Ian Graham

by Lisa Lopuck

Drafting An Effective RFP



Lisa Lopuck, www.lopuck.com, is a Web creative consultant helping companies define and plan their Web creative strategy, information flow, and visual look and feel. She is also the author of numerous best-selling books on Web design, including "Web Design for Dummies," and is a sought-after speaker at Web conferences and universities around the world.

If you work for a company that is looking to hire an outside consultant or agency to help you with your Web development efforts—or any creative initiatives for that matter—do yourself and your company a favor by drafting a solid RFP (Request for Proposal) before you even make the first phone call.

An RFP is a valuable "focusing" tool that will help your team fully understand your Web creative needs. Once you can put your team's goals, creative needs, schedule, and budget in writing, you can send the RFP to select agencies and ask them to put a proposal together for the work. A good RFP becomes an accurate measuring stick against which you can judge incoming proposals. Without an RFP, or with a half-baked one, you are likely to receive proposals that are all over the board in terms of scope and budget, making it difficult for your team to decide on the right agency.

> **A good RFP becomes an accurate measuring stick against which you can judge incoming proposals.**

Key RFP Ingredients

The first section of an RFP should include background information about the company followed by the current project needs and how the project fits into the business and marketing goals of the company. This information, which should take up no more than a page, helps an agency better understand your business and the context of the proposed project.

Each Web project usually has a unique set of problems to solve. After the company and project background information, list a set of requirements and open issues. For example, you may have an existing database that the new system must use. Therefore, there may be special programming and server requirements. If there is specific advice you'd like from the agency or concerns you have, you can include a list of questions that you'd like to see addressed. For example, if one of your concerns is a back office online fulfillment strategy, include a question like, "How do your propose handling online fulfillment?"

Content Outline

I've found that the most helpful ingredient in an RFP is an outline of the site's proposed structure. An outline is a laundry list of all the proposed content and functional elements that should be included in the new site. A lot of companies assume that it's the design agency's job to build an outline as part of the "information architecture" stage. This is not necessarily the case. A company can save itself a lot of time and money by brainstorming a "wish list" of content and functionality. Not only does a wish list give an agency a sense of the size and complexity of the project, but it also requires a company to articulate exactly what they are looking to achieve.

Armed with such an outline, or "wish list," an agency can make an accurate bid and, if chosen, can help a company structure their information in the most logical and useful way—the so-called "information architecture" stage.

Logistics, Timeline & Budget

To finish up the RFP, it's helpful to include a list of your competitors' sites and also a list of Web sites that you like for one reason or another. This will give an agency a visual reference of the look and feel you are after as well as an idea of what the competitors are doing in their sites. You should also share logistical information like hosting and maintenance requirements. Are you looking for an agency to recommend a hosting facility or a maintenance contract separate from the initial design contract?

Finally, as much as companies resist "showing their hand" when it comes to budget, it's absolutely critical to state what the overall, not-to-exceed budget is for a project. A preferred rollout timeline, along with budget requirements, will help an agency assess the best strategy for implementing your project goals. If your RFP includes all of these elements, you are primed to receive accurate bids and are on your way to a successful project. I've included a downloadable RFP template on my Web site at www.lopuck.com. ■

You can contact Lisa at lopuck@cpumag.com.

The Department Of Stuff

by Rob "Cmdr Taco" Malda

trust.txt

Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler then he actually is.

Hey, Rob: Congratulations from the *CPU* staff on your engagement. =)

Do you trust me? Why? Do I deserve it? With a nickname that involves a Mexican fast food, you probably should think pretty hard before you answer. I mean, you're reading this piece of paper here, which lends a certain amount of credibility to the words I say. There are editors who presumably think that the words I've written have enough value to print. But have you met them? Do you know for sure they aren't part of "The Conspiracy"?

It's even worse online. The 'Net was able to give anyone and everyone a voice. The result of this is a cacophony of voices, and you're standing in the middle of it trying to decide who to listen to. Who do you trust? It's more complicated than just words. I mean, if I go to the *New York Times* site and sign their cheesy registration, I can read words approved by their editors. But are those words better than the ones that I read on some random Web site or anonymous posting in a forum of a site that I've never heard of and basically stumbled on following a Google search?

> **How many people do I have to trust before I find Kevin Bacon?**

There are a few obvious clues that experienced 'Net users often use when deciding who to trust. If a person's domain name is screwmicrosoft.com, you may want to consider what sort of slant the writer has. Or you could glance at the content: A site that has a thousand stories and daily updates is likely more reliable than a site that has three pages posted six months apart that are largely about human bodily functions and the funny noises they make.

If you see my name on my Web site, you can be fairly certain that you are actually reading my words. But do you trust that when you are playing Quake III Arena and you frag "CmdrTaco," it's really me? I promise you it isn't because my name is snagged on pretty much every online game before I have a chance to claim it as my own. But it fools people constantly, as evidenced by the friendly e-mails I get from people thanking me for a good game or flaming me for racist remarks made under my nickname on some forum I've never heard of. These nice people put their trust in something that was simply not true.

But determining who and what is trustworthy gets much more difficult when the system you are using to fetch information becomes truly peer to peer. Remember when Napster didn't suck? Each time you wanted to download a song, you needed to decide if you trusted the source. You had to base this decision on little more than a username, a file name, an IP address, and a bandwidth speed number. And any of these could be lies! When you actually committed to pulling down the 5 megs or whatever, then you would learn if you actually got the song you were expecting or instead got a four-minute audio commercial for feminine hygiene products. You just never knew!

Many 'Net functions have implemented systems to aid you in deciding who and what to trust. If I visit eBay, I can use that site's system to decide if my salesman will actually deliver after I bid. Other systems have Karma or Experience or any number of other methods to aid you in the decision-making process.

The next generation of Internet applications has to take this trust one step further. If you encounter someone in Quake, in a discussion board, or on KaZaA, you need to determine if this user is trustworthy. Do you know he isn't actually a Quake Bot? A troll? A server spoofing file names and serving infomercials claiming to be a boy band? It gets far more interesting when you start making it recursive. I trust a handful of people, and they each trust their own pockets of people. How many people do I have to trust before I find Kevin Bacon?

Of course, any such "truth-seeking" system needs to be optional because the privacy freaks are going to go bananas when they think big brother is going to hunt them down; they don't want their friends to know that they are frequent posters to some Felicity chat room. But such a system should be standardized to help us use the Internet for what it was intended: the sharing of information.

I'm not suggesting that such a system would ever replace common sense. Instead what I'm suggesting is that it would be cool if a system existed so that you could know who you were talking to. Who you were fragging. Who you were downloading a file from. And what other users' experiences have historically been with them. ■

E-mail me at malda@cpumag.com and I'll write back. Trust me.

Forward Slash

by Joan Wood

Real Content

Starting as gopher for the Emmy-winning team that pioneered live in-car TV cameras for the Indy 500, Joan became an independent video/sound engineer, technical director, and producer. Playing with Reality Engines and motion platforms led to co-founding Xatrix Entertainment where she produced the two Cyberia games. Before 3-D acceleration was trendy, she formed Mango Grits to develop hardware-only game Barrage for Activision. Since cashing out from SharkyExtreme.Com, where she was co-founder and managing editor, Joan has retired.

When the idea of cable television was first proposed, "experts" predicted that consumers would not pay for something they were accustomed to receiving free. Somehow the convenience of good reception, without the need for a cumbersome antenna, and the ability to view new channels not available over the airwaves just didn't sound compelling at the time. And why would it? TV was free . . . like the Internet.

Flash forward. There has been a lot of noise about RealOne, the upgraded GoldPass subscription service from RealNetworks launched last December, which combines the RealPlayer and RealJukebox media players with a custom browser to serve up a growing list of exclusive streaming media content. The general layout of the player is quite nice, with content playing at top left, detailed contextual info about the clip at top right, and the appropriate Web page displayed below. Still in beta, the final version of RealOne is expected sometime in the next few months, but current complaints range from the speed and quality of its codec to user privacy and spamvertising issues, with much attention placed on comparing the limits of its RealOneMusic service to the freedom of a P2P Napster habit. At $9.95 *per month* (not the misleading "US$9.95" price listed on some download pages), RealOne is fairly robust (for beta) but hardly bulletproof. So why the heck would I choose to pay for this service? Not because I'm particularly thrilled with the technology or dazzled by its business model but because RealOne offers programming that I actually want.

RealOne happens to offer programming that I actually want.

Being a news junky, it was ironic that I received, and read, a daily e-mail preview of my current mainstream news program of choice, ABC's "World News Tonight," but routinely missed the actual show, which airs here on the West Coast quite early at 5:30 p.m. Well, no longer. I can now rent the right to view the show (without commercials) online, in its entirety or browse by segment, at my convenience, via RealOne. This alone is worth $9.95 per month to me, and apparently, I am not alone. New subscription figures released by RealNetworks indicate that RealOne and GoldPass services combined have more than 500,000 paying subscribers. This paying customer base seems to be attracting content owners and vice versa, and that qualifies as a business plan, even if it will be going up against Microsoft's new "Corona" version of Windows Media Player.

In addition to ABCNews.com, RealNetworks has announced agreements with content providers CNN, FoxSports.com, and E! Online, among many others. The quality of RealOne exclusive 'Net content is uneven: some very professional, some quite dreadful. But while revenue from the subscription service is not going to make or break CNN or ABC, it does provide these entities with the financial justification to repurpose their content onto the 'Net and thus allow the possibility of greater access. It also puts a business model in place that smaller companies could potentially use to support their own archived or newly created streamable material. This could become the most interesting aspect, as RealNetworks has also struck content deals with lesser-known entities such as MediaBay.com for old-time radio broadcasts and racy stuff from Audible.com. Strategic agreements with non-PC manufacturers have also been announced, including Hitachi, Nokia, and DVR champion TiVo, which certainly indicate that RealNetworks also has a desire to get Real with everything from your TV to your mobile phone.

If you want to sample the RealOne service, realone.com is currently offering a free 14-day trial (click the tiny blue Our Free Player link in the center of the page), which requires your credit card. If you decide not to subscribe, make sure to cancel before your 14 days are up, which unfortunately must be done by phone. Welcome to the new 'Net. ■

Want to get Real too, or pelt me with Ogg? Dial joan@cpumag.com

NetBit: Think you have it hard? Quit whining and read this memoir of an EARLY adopter: http://home1.gte.net/bputnam/catv/catv1.html

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NEC

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NEC/MITSUBISHI
NEC-MITSUBISHI ELECTRONICS DISPLAY

by Chad Denton

Road Warrior

Palm Whacks The Wires, A Sharp PDA, Portable Power & More From The Mobile Front

Palm Works Without Wires

Everyone knew the i705 was coming. Granted, rumor sites aren't always reliable, but after the FCC posted approval for the new Palm (www.palm.com) wireless gadget in August 2001, the only real question left was when Palm would announce it. Palm officially did so in January.

The device picks up where the Palm VIIx left off. The i705 has a sleeker, sexier package that measures just 4.7 inches long x 3.1 inches wide x 0.6 inches thick and weighs less than 6 ounces. Palm mercifully axed the flip-up antenna, replacing it with a less obvious fixed antenna.

Aside from the new look, the i705 includes a few new tricks. The "always on" design means messages sent to a user's palm.com account arrive automatically. MultiMail Deluxe Desktop Link installs on your PC at work and transfers e-mail between your PDA and a corporate network. You can also configure the i705 to download e-mail from personal POP3 or IMAP accounts, but you'll have to manually check your personal accounts for new e-mail.

Most aspects of the i705 are highly configurable. You can set different alerts for incoming e-mail (including a flashing LED and a vibrating alarm) and download only Subject lines or the entire content of each message. You can also filter e-mail from your palm.com account to only see the messages you really want. You can even program the radio to switch on and off at the same time every day to conserve battery power.

Physically, the i705 has a grayscale display, SD slot for adding software and hardware, and Palm's Universal Connector for clipping on dial-up modems, GPS receivers, and other hardware not available in SD format. The i705 is available for $449; service starts at $19.99 a month. ▲

The new Palm i705 is far better looking than the bulky, old Palm VIIx. The i705 can automatically retrieve e-mail and alert you when new mail arrives.

Intel's New Processor

Notebook systems utilizing the mobile version of the Pentium 4 are finally beginning to appear more than a year after Intel (www.intel.com) debuted its desktop version of the P4. Although the Pentium 4-M will let Intel push mobile CPU clock speeds up to 2GHz, the chip has drawbacks. Reports indicate the new chip runs a little hotter and is a bit more power-hungry than current high-end mobile processors.

In addition to the mobile processor, Intel will introduce a new motherboard chipset: the 845MP. Among the goodies it provides is support for DDR-SDRAM and NetBurst.

Despite the new mobile processor, the Pentium III-M isn't expected to just ride quietly into the sunset. Given the Pentium 4's thirst for power and tendency to generate heat, Pentium III-M processors are expected to remain the popular choice in smaller designs where heat and power concerns are most important. Next year, Intel is expected to introduce a new mobile processor code-named Banias. ▲

Sprint Delivers Wireless E-mail

Although it's nice to be mobile, it's also comforting to know the information you need is sitting in front of you on your desktop. Leaving your desktop behind means potentially leaving important information behind, also.

Sprint PCS (www.sprintpcs.com) hopes to change some of that with its Business Connection Personal Edition service. Users can download and install software on their PCs that lets them connect to Microsoft Outlook and Lotus Notes from their Sprint PCS wireless phones. This includes access to a user's calendar, tasks, and e-mail. Users will also be able to access this information from a desktop computer or other wireless devices via the Sprint PCS Web site.

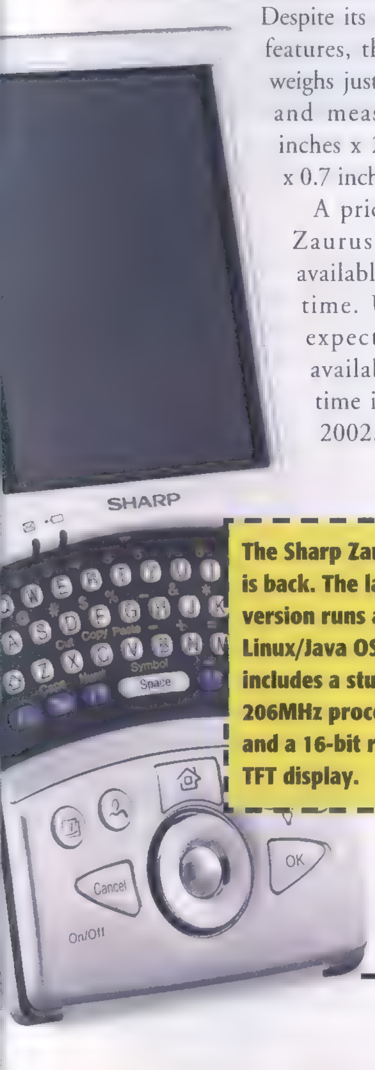
Although pricing information wasn't available at press time, the service is expected sometime in Q1. ▲

A Sharp Linux PDA

If it wanted, Sharp (www.sharpusa.com) could claim it was making PDAs before PDAs were cool. The company's Zaurus line of personal organizers was fairly popular in the pre-Palm era, but of late, the Zaurus has been confined to the Japanese market. However, the Zaurus is back in the United States with the SL-5500.

The SL-5500 runs Linux and Java, has a sleek design, and features some impressive Pocket PC-like stats. The device includes a 3.5-inch reflective TFT display capable of handling more than 65,000 colors at a 240 x 320 resolution. The model also features a 206MHz Intel StrongARM processor and ships with 64MB of memory. A media player lets the Zaurus handle video and audio files, while a Web browser and e-mail client provide Internet connectivity. If you need more than 64MB of storage, the Zaurus has CompactFlash and SD/MMC slots. Despite its impressive features, the Zaurus weighs just 7 ounces and measures 5.4 inches x 2.9 inches x 0.7 inches.

A price for the Zaurus was not available at press time. Units are expected to be available sometime in late Q1 2002.



The Sharp Zaurus is back. The latest version runs a Linux/Java OS and includes a sturdy 206MHz processor and a 16-bit reflective TFT display.

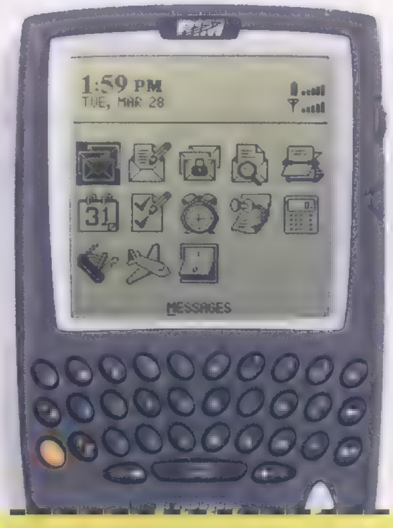
Visor: A Collector's Item?

During a January conference call to discuss its Q2 2001 financial results, Handspring CEO Donna Dubinsky stated that the company would eventually move away from its traditional organizer lineup in favor of communicator devices similar to the Treo.

The comment generated great interest. For one thing, the Treo lacks the Springboard expansion slot that generated so much excitement when Handspring (www.handspring.com) introduced its Visor. Moving to Treo-like devices that combine PDA/phone functionality might signal an end to the Springboard slot.

To clarify Handspring's position, Jeff Hawkins, cofounder of Handspring along with Dubinsky, sent an e-mail message to developers stressing Handspring would continue to support its organizer line and Springboard developers as long as demand made such support viable. Hawkins added, however, that the company would streamline its PDA offerings by concentrating on the Visor Pro, Neo, and Edge, leaving many to speculate on the fate of the Handspring Visor Prism, the company's only model with a color display.

In other Handspring news, the company began shipping the Treo in February. The Treo 180 has a built-in keyboard for data entry while the Treo 180g uses Graffiti handwriting recognition. Both are available directly from Handspring for $399 with service from VoiceStream or Cingular Wireless.



The RIM BlackBerry 957 is a popular BlackBerry device that operates over the Motient network. Motient recently filed for Chapter 11 but expects to continue its service while restructuring the company.

Another One Files

RIM (www.rim.com) users take note: Motient (www.motient.com) has filed for Chapter 11 bankruptcy protection. Motient is probably best known as a service provider for popular RIM BlackBerry two-way messaging devices. Motient also recently released a wireless modem for the Palm V.

Chapter 11 protects a company from creditors and helps it eliminate some of its debt while it restructures. Motient expects to continue service through its restructuring and break even later this year.

Splitting Up

In other Palm news, the company's business relationships with its licensees may become somewhat more comfortable after making PalmSource a separate subsidiary of Palm in January. PalmSource is responsible for development of the Palm OS. The split means Palm's hardware group will have to pay to license the OS from the subsidiary as other licensees do.

Companies, such as Sony and Handspring, license the Palm OS for devices that compete against Palm's own hardware. Licensing the OS to competitors is a little like renting your best employee to your biggest competitor. Now, however, Palm's operating system group has a bit more independence, and Palm is hoping the move will spur improvements to the OS.

The move has been discussed since last summer. In August, Palm hired David Nagel as president and CEO of the new subsidiary. Before joining Palm, Nagel was a senior vice president at Apple Computer and AT&T's CTO. If things go well and PalmSource can stand on its own, Palm may spin it off into a separate company, as opposed to a mere subsidiary. We're not marketing types, but we would recommend changing the name of the new subsidiary before spinning it off as a new company.

At Your Leisure

Compiled by Samit G. Choudhuri & Chris Trumble

Plug In, Sit Back & Fire Away

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in game consoles, games, PCs, DVDs, and just stuff we love, read on.

SSX Tricky

Tricky Snowboarding With Run DMC

SSX Tricky players can pull off some insane tricks. Fortunately, so can *CPU* mag's flatland editors.

SSX Tricky is about snowboarding to the extreme. Skip the game (and this review) if you've already had your SSX jollies on the PS2. But if you own an Xbox and have never played this game, you owe it to yourself to check it out. SSX Tricky is a good time just waiting to happen.

Of the three snowboarding games now available for the Xbox, SSX Tricky is our numero uno pick. It offers Practice, Single-Event (including two-player split screen), and World Circuit modes. The true focus is the World Circuit mode, where you race to unlock other playable characters, equipment, costumes, tracks, and more. Performing stunts and knocking down opponents lets you max out your trick meter. You then have 20 seconds to pull off an Uber-trick as Run DMC's "It's Tricky" hits the speakers.

The game's far-out physics introduce a fair amount of ooh-aaah as you perform insanely cool Uber-tricks. Listen closely and you'll recognize your opponents' voices in the way of Lucy Liu, David Arquette, Macy Gray, and Billy Zane, amongst others. The celebs lend bits of their personae to in-game characters, which tosses some comedy into the fray. An included DVD shows the making of the game and has celeb interviews.

Unfortunately, SSX Tricky is more of a direct port than needed. The game doesn't support the Xbox's personalized soundtrack feature, and the remix of "It's Tricky" plays ad nauseum. Next time, EA, let us choose our own music. Otherwise, SSX Tricky is a ton of fun. ▲

SSX Tricky (Xbox)

$49.95
EA Sports
ssxtricky.ea.com

DVD Bytes by Todd Doogan

TRON: 20th Anniversary Collector's Edition

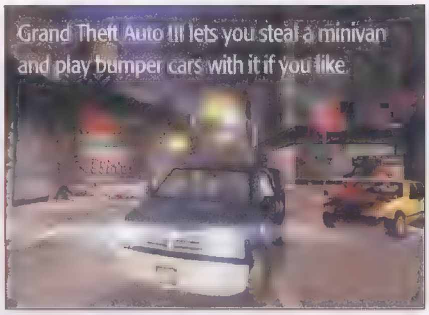
"TRON" may feature an extinct computer language and feature some crude CGI, but give it this much: It was one of the first live-action productions to do so. Without TRON, we wouldn't have "Terminator 2" or even "Jurassic Park." Because it's been such a pioneer, "TRON" has been hailed as a classic, and deservedly so.

Now, Disney is treating it as such with its very own special double-disc set. Not only do we get a newly remastered video and audio presentation in anamorphic widescreen and Dolby Digital 5.1, we get some of the most comprehensive extras ever culled together for a DVD. First, there's an incredible documentary about the making of "TRON" with just about everything you could ever want collected together. It just keeps getting better with a nice selection of deleted scenes with introductions from Bruce Boxleitner, photo galleries featuring early production designs and concepts, storyboards, and best of all, a commentary track that documents the fact that a "TRON 2.0" is coming.

Grand Theft Auto III
Walk On The Wild Side

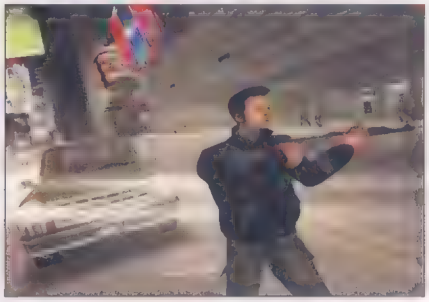
One of the best things about video games is that they let you play at doing things you'll never, ever do. Let's face it, most of us won't ever get to throw the final strike in game seven of the World Series or fly an F-14 Tomcat. Likewise, most of us probably will never work our way into the local mafia by picking up odd jobs here and there and proving our value as hired thugs. But that's exactly what you'll do in Grand Theft Auto III.

As the game begins, a movie clip shows your character and two others high-tailing it away from a robbery you've just committed. Your female accomplice (who is also your girlfriend) double-crosses you and shoots you, leaving you for the police to capture. As luck would have it, however, a group of thugs attacks the paddy wagon taking you to jail in order to free a buddy, and you get the chance to get away, too.


Grand Theft Auto III lets you steal a minivan and play bumper cars with it if you like.

Once you escape, the game is extremely open-ended. A fellow escapee introduces you to a local organized crime rep. He'll give you jobs that can earn you cash and street cred, but you can do whatever you like. Steal a cab and patrol the streets for fares. Steal an ambulance and respond to emergency dispatches. You can even roam the 3-D streets picking fights (hand-to-hand and weapons combat are part of the fun) and stealing cars at random.

Whatever path you choose, you'll have a blast. Driving the streets of Liberty City is fun, even if you're just exploring. You have a variety of perspectives (and several radio stations) to choose from, and gameplay is even better than the game's graphics. GTA III earns its M rating, but it's one of the most engrossing games yet on the PS2. ▲


The old top-down view from past Grand Theft Auto installments is gone in GTA III, giving way to living 3-D environments and characters.

Grand Theft Auto III (PS2)

$49.99
Rockstar Games
www.rockstargames.com/grandtheftauto3

Maximo: Ghosts To Glory
A 3-D Return To Days Of Yore (The '80s)

Anybody who ever played Capcom's Ghosts 'N Goblins games in the arcade or on game consoles will instantly recognize what's going on in Maximo, even though a great deal has changed. Although Maximo is one of a new breed of retro-themed games brought to life in 3-D, the game's hero still battles a variety of skeletons and zombies, and he still loses bits of armor as he sustains damage, as well.

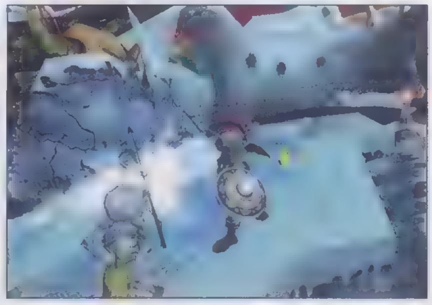
As the game begins, Maximo returns to his castle to find out his right-hand man, Achille, has kidnapped his girl, Sophia, and usurped his power. Achille sends him into the afterlife with a powerful magic spell, but Death sends him back because he doesn't appreciate the fact that Achille is resurrecting the undead and using them for his own purposes.

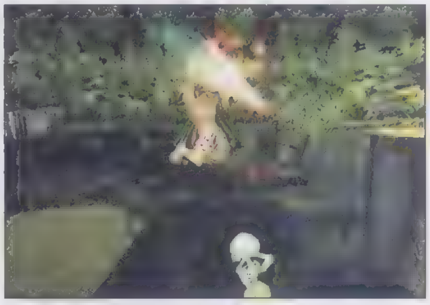
From this point on, Maximo is less about the story than it is about good, old-fashioned platform action. Maximo jumps, has two basic attacks (and can earn several more), and needs to collect coins to buy stuff like more armor, health power-ups, and the like. Capcom did a good job of blending retro gaming concepts with modern 3-D graphics, including a variety of interesting levels and all kinds of baddies to destroy.

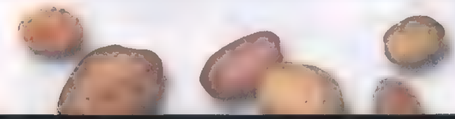
We would offer one caveat, however. You shouldn't take Maximo's colorful, unassuming look to mean that the game is easy. Simple, yes, but not easy. In fact, even battle-scarred gamers of many years will find themselves being defeated and having to play levels over, sometimes several times. The good news is that it's not difficult enough to diminish the fun you'll have playing it. ▲

Maximo: Ghosts To Glory (PS2)

$49.99
Capcom
www.capcom.com/maximo


When Maximo's health meter is fully stocked, he's got a full suit of armor to protect him from the creatures of the night. But . . .


. . . when Maximo's health is nearly gone and he's in danger of kicking the bucket, he's left wearing nothing but his boxers and a look of grim determination.



Max Payne: PS2 & Xbox Bring On The Payne

If you've played the PC version of Rockstar Games' Max Payne (or if you read our review of it in the December issue of *CPU*), you know exactly what to expect from the PlayStation 2 and Xbox versions. There are slight differences, of course, in terms of control and appearance. Of the two console versions, the Xbox rendition looks more like the PC version; the game's textures and effects don't look quite as impressive, but the game keeps up an impressive frame rate thanks to the Xbox's NVIDIA GPU.

But both offer the same, gritty environments and the same hard-driving, third-person action, inspired in large part by John Woo films ("John Woo" is even a password someone will have to use on your behalf in order to get where you need to go).

Max Payne is a straight-laced New York cop until drug-crazed ruffians destroy his life by snuffing his wife and kid. He then joins the DEA in an effort to find those responsible and bring them to justice. The case goes unsolved for three years, until Payne's DEA superior (one of only two men who know he's working undercover to infiltrate the mob in the Big Apple) gets a tip and requests a meeting at the Roscoe Street subway station. Max shows up, only to find a bunch of mafia muscle wasting transit cops and, unfortunately, his DEA contact.

The bad guys frame Max for his friend's murder, hoping to shake him off their trail, but with your help, Max goes on the rampage, a rogue cop determined to get to those pulling the strings. The game is interspersed with storyboard/comic book cinema scenes and some fairly over-the-top narration, but if you're like us, you'll pay far more attention to such things as the way shell casings tumble to the floor in slow motion from Max's guns when you activate the game's Bullet Time feature. This stylish game is dripping with atmosphere, and we loved every minute of it. ▲

Max Payne takes on the mafia and looks good doing it, thanks to Xbox's graphical prowess.

Max Payne (PS2, Xbox)

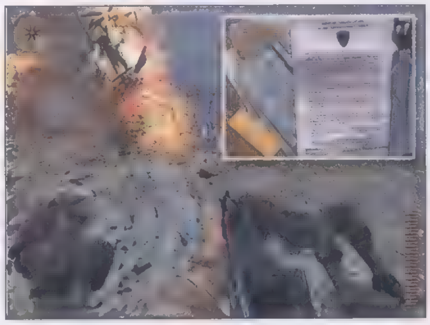
$49.99
Rockstar Games
www.rockstargames.com/maxpayne

Medal Of Honor: Allied Assault
Saving Ryan's Privates

Medal Of Honor: Allied Assault is a fantastic single-player experience that follows on the heels of the rather sterile Nazi-bashing experience that is Activision's Return To Castle Wolfenstein. Yes, both games are based on the Quake III: Team Arena engine and both let you unleash hell on Nazis, but still . . . the single-player experience of Wolfie comes a distant second to MOHAA.

MOHAA doesn't pour on the storyline: Receive your mission objectives and away you go. Missions are linear and your OSS character gets further objectives later on. The physics of your character's motions seem more realistic than many other FPS games, but don't let that or heavy scenarios fool you into thinking this is a simulation. This is an intense action-shooter and pretends to be nothing else.

Your journey starts in Algeria and takes you to Norway, France, and beyond. You'll run with the Rangers, shoot with the SAS, suddenly finding yourself entrenched in the gameplay as game events pull you along. The German the enemy speaks adds to the game's atmosphere. Bullets and explosions whiz by, and the music is well timed. There are a few problems: The game's AI is at times stupid and at times good. Further tweaks would have made this already good game brilliant. We did find the lack of blood odd; it seemed almost surreal to shoot Nazis who didn't bleed. (We found a non-EA-sanctioned patch that adds blood.) However, the game plays very well, and the lack of blood is a very minor omission. ▲

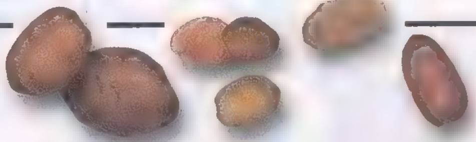


Fire in the hole! MOHAA features bloodless combat, but fortunately, explosive gameplay more than makes up for that oversight.

The first mission's opening sequence sets the tone for the game: all hell breaks loose.

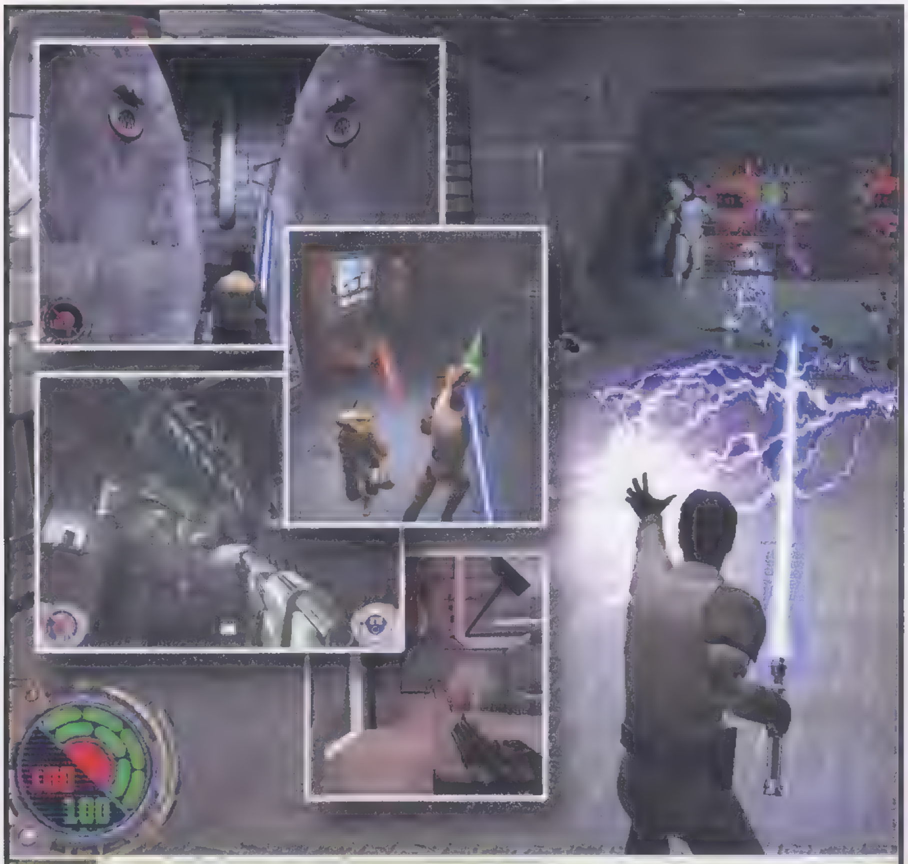
Medal Of Honor: Allied Assault (PC)

$49.95
EA Games
mohaa.ea.com

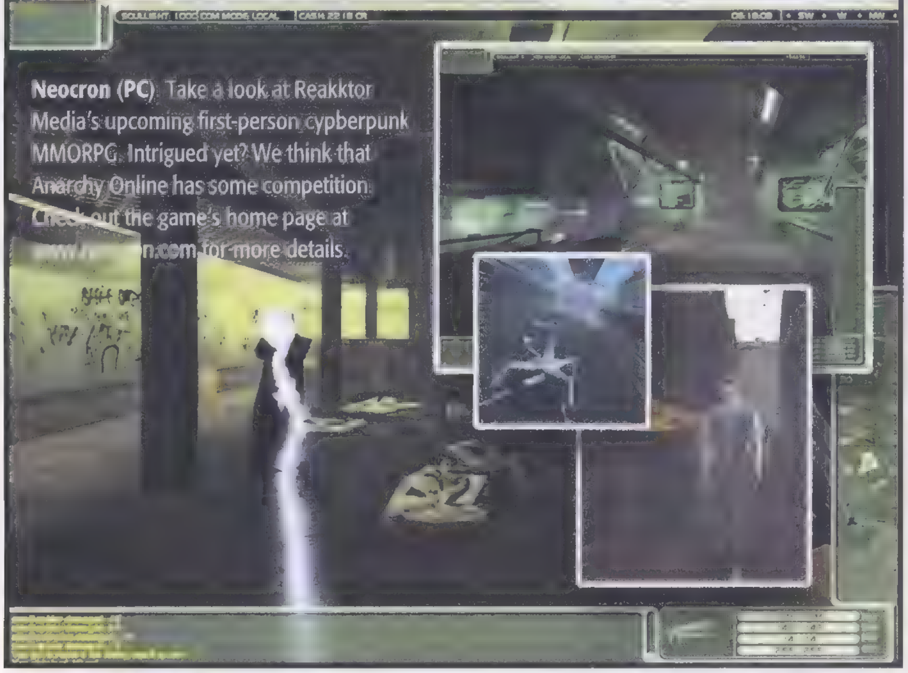


Hot Shots: The Beauty Of The Game

Yeah, we know it's all about the gameplay. Who needs eye candy? Remember how awesome Elite (on the BBC Micro), Knight Lore and Jet Set Willy (on the Sinclair Spectrum), Spy vs. Spy (on the Commodore 64), and Karateka (on the Apple IIe) all looked in their heyday? Great graphics don't hurt. There's nothing better than stellar gameplay combined with knockout graphics to make that killer game.



Jedi Knight II: Jedi Outcast (PC). What better way to warm up for "Episode II: The Attack Of The Clones" on May 16 than by playing a new Star Wars game? If LucasArts has its dates right, JK2 should be hitting stores as you read this. Here are a few exclusive screens from the game to show you what you'll be missing if you forget to indulge in the Force this Spring.



Neocron (PC). Take a look at Reakktor Media's upcoming first-person cypberpunk MMORPG. Intrigued yet? We think that Anarchy Online has some competition. Check out the game's home page at [illegible]n.com for more details.

Infinite Loop

Four Letters, Begins With "S"

Think your inbox is already too full? Analysts are forecasting that marketers will e-mail more than 206 billion spam messages in 2006. Better put your filters on a high fiber diet.

Source:
Jupiter Media Metrix

APPROACHING OFFICE APPS

Make Access A Little More Accessible

ADMIT IT. YOU LOVE SPENDING YOUR FREE TIME DIGGING FOR GOLD SOFTWARE EFFICIENCY NUGGETS THAT HELP YOU WORK FASTER AND SMARTER.

You're probably pretty comfortable with Access, but you may not know all you could to make Microsoft's heavyweight database program really sing. After all, this program is deep. A hefty programming language and myriad options for entering, handling, and retrieving data back it up. In this (and subsequent) articles, we'll go over some quick ways to dramatically increase your efficiency in Access and let you in on some inside secrets.

You Put Your Data In, You Take Your Data Out . . .

At first glance, entering data in Access is pretty straightforward: You display the table in Datasheet or Form View, click the New Record button on the toolbar, and enter your data. Save the record (by moving to a different record or pressing SHIFT-ENTER) and you're on your way. But don't stop there. Here are a few tips to make data entry even easier.

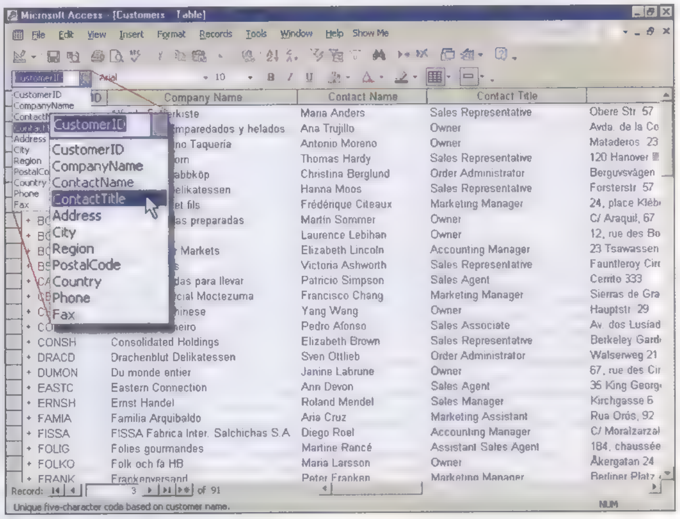
One of the best ways to speed up data entry is to use keyboard shortcuts. Here's a good one: To repeat a field value from the previous record, press CTRL-Apostrophe ('). For example, if Chicago is a field value in one record, you can press CTRL-' to copy the value into the next record's field. Other data-entry shortcuts include pressing CTRL-Semicolon (;) to insert the system's current date and pressing CTRL-SHIFT-Colon (:) to enter the current time. CTRL-plus sign (+) adds a new record; CTRL-minus sign (-) deletes the current record.

Another way to control Access is to control the behavior of the insertion point during data entry. By default, the insertion point moves to the next field in a record when you press the ENTER or TAB key, but don't let the default setting stop you from doing what you want. Choose Tools, Options to display the Options dialog box and then click the Keyboard tab. In the Move After Enter section, select where you want the insertion point to go when you press ENTER: to the next field, the next record, or not at all.

And while you're there, you might as well set Access' default behavior for selecting fields automatically when you use the ENTER, TAB, or arrow keys to move to the field. In the Behavior Entering Field section, choose Select Entire Field, Go To Start Of Field, or Go To End Of Field, depending on how you want the insertion point to move.

You'll probably also find that you occasionally need more space to type an entry than what displays in the datasheet. You can always resize the column, but here's another option: Expand a field to make it easier to edit in Datasheet or Form view. Click in the field and then press SHIFT-F2. In the pop-up Zoom dialog box, enter your text and then choose OK. Don't be fooled by the size of the Zoom dialog box, though. Access will stick to its guns (and field property values) and chop off excess text, even if it looks like there's plenty of space to enter it in the Zoom dialog box.

A couple of final notes about data entry: To undo changes in the current field, press ESC once; to undo the modifications for an entire record, press ESC twice. Of course, if you've already saved changes to the current record or have moved to another record, you can choose Undo Saved Record from the Edit menu. Just keep in mind that as soon as you edit



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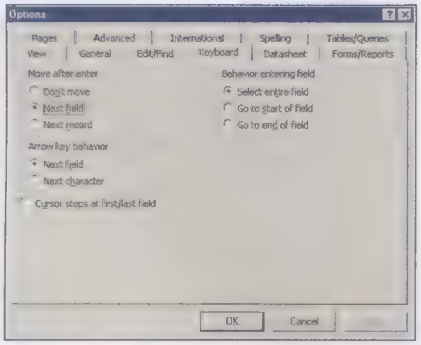
	mparedados y helados	Ana Trujillo	Owner	Avda. de la Co
	no Taquería	Antonio Moreno	Owner	Mataderos 23
	orn	Thomas Hardy	Sales Representative	120 Hanover
	abbköp	Christina Berglund	Order Administrator	Berguvsvägen
	elikatessen	Hanna Moos	Sales Representative	Forsterstr 57
	et fils	Frédérique Citeaux	Marketing Manager	24, place Kléb
BC	as preparadas	Martín Sommer	Owner	C/ Araquil, 67
BC		Laurence Lebihan	Owner	12, rue des Bo
BC	Markets	Elizabeth Lincoln	Accounting Manager	23 Tsawassen
BS	s	Victoria Ashworth	Sales Representative	Fauntleroy Cir
CA	das para llevar	Patricio Simpson	Sales Agent	Cerrito 333
CE	cial Moctezuma	Francisco Chang	Marketing Manager	Sierras de Gra
C	hinese	Yang Wang	Owner	Hauptstr 29
CO	eiro	Pedro Afonso	Sales Associate	Av. dos Lusíad
CONSH	Consolidated Holdings	Elizabeth Brown	Sales Representative	Berkeley Gard
DRACD	Drachenblut Delikatessen	Sven Ottlieb	Order Administrator	Walserweg 21
DUMON	Du monde entier	Janine Labrune	Owner	67, rue des Cir
EASTC	Eastern Connection	Ann Devon	Sales Agent	35 King Georg
ERNSH	Ernst Handel	Roland Mendel	Sales Manager	Kirchgasse 6
FAMIA	Familia Arquibaldo	Aria Cruz	Marketing Assistant	Rua Orós, 92
FISSA	FISSA Fabrica Inter. Salchichas S.A	Diego Roel	Accounting Manager	C/ Moralzarzal
FOLIG	Folies gourmandes	Martine Rancé	Assistant Sales Agent	184, chaussée
FOLKO	Folk och fä HB	Maria Larsson	Owner	Åkergatan 24
FRANK	Frankenversand	Peter Franken	Marketing Manager	Berliner Platz

Unique five-character code based on customer name.

Don't spend your time wandering around a large table looking for a specific field. Just use the Go To Field box.

another record, apply or remove a filter, or switch to a different window, you can't reverse the changes.



Move after enter
○ Don't move
● Next field
○ Next record

Arrow key behavior
● Next field
○ Next character

☐ Cursor stops at first/last field

Behavior entering field
● Select entire field
○ Go to start of field
○ Go to end of field

Assert your authority over Access' default behavior in the Options dialog box.

Get Around

Spend any time with Access, and you're sure to use the buttons on the Navigation toolbar that display at the bottom of the application window. But, as a certified geek, you can also use the record number box that displays between all those buttons. Double-click in the box (or press F5), type the record number you want, and then press ENTER.

And even the best of us get frustrated having to scroll through endless fields in a large table. Instead, use the Go To Field box. To do this, open the table in Datasheet view and then point to Toolbars on the View menu. Click Formatting to display the Formatting (Datasheet) toolbar. The leftmost item on the toolbar is the Go To Field box. Click the box's drop-down list arrow and then choose a field to quickly move to it.

For Your Eyes Only

You probably know at least one person, intoxicated with a sense of power once he begins to poke around in Access, who feels he can manage databases better than you. To prevent trouble in paradise, hide tables in the Database window so no one else can accidentally destroy them. In the Database window, rename the tables you want to hide by adding a prefix of usys to them. For example, if your table's name were Customers, the new name would be usysCustomers. This makes the table a system object, which, by default, is hidden from view. In fact, the second you rename the table, it disappears from view in the Database window. To redisplay the table, change the settings in Access to show system objects: Choose Tools, Options, and then click the View tab. Check the System Objects box. When you close the Options dialog box, the usys tables will reappear on the list, ready for use or renaming.

You can also hide columns in a table's Datasheet View. This keeps the data in place but makes it easier for you to work with the remaining columns. You can hide a single column by selecting it in Datasheet View and then choosing Hide Columns on the Format menu. But this gets cumbersome when you want to hide several columns at once. Instead of laboriously repeating the Hide Columns command for each column, try this: Choose Format, Unhide Columns to display the Unhide Columns dialog box. Each displayed column has a checked box next to it, so just clear the boxes for all the columns that you want to hide and then click Close. To redisplay them, just reverse the process.

Streamline Input

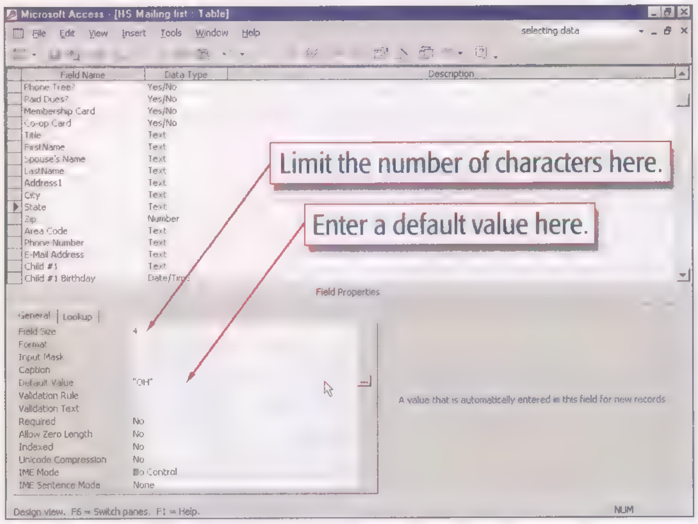
One of the more important features of a database is . . . well, data. In fact, all the bells and whistles you can use in a database don't matter if the data isn't accurate. And as you know, the people who input data can sometimes mistype or be downright sloppy. Head off these problems at the pass by using some of Access' many built-in features to limit the type of data you let in the database or even enter it ahead of time.

One way to prevent errors is to specify a default value for fields where a value is used most (but not all) of the time. Imagine, for example, that you have a customer table that includes mainly clients from Ohio. You can use a field's (or a control's) default value property to automatically place OH in all new records. Specifying a default

Yeah, We've Got A Shortcut For That

Selecting records and data is easy, but PC giants like us want to know every way possible to complete the same task. In other words, we get a kick out of trying every keyboard shortcut and mouse click out there. Here are a few to get you started.

To . . .	Do This . . .
Turn on Extend mode so EXT appears in the lower-right corner of the window	Press F8
Select characters to the right or left when Extend mode is active	Press the Left arrow or Right arrow
Extend one word to the right (or left) when Extend mode is active	Press CTRL-SHIFT-Right arrow or CTRL-SHIFT-Left arrow
Cancel Extend mode	Press ESC
Switch between Edit mode (with the insertion point) and Navigation mode	Press F2
Select the current column (or cancel the column selection) in Navigation mode	Press CTRL-Spacebar
Select the column to the right of a selected column	Press SHIFT-Right arrow
Select the column to the left of a selected column	Press SHIFT-Left arrow
Use Move Mode	Select a column, press CTRL-SHIFT-F8, and press the Right or Left arrow to move the column to the right or left.


Microsoft Access - [HS Mailing list : Table]
File
Edit
View
Insert
Tools
Window
Help
selecting data
Field Properties
General
Lookup
Design view. F6 = Switch panes. F1 = Help.
NUM

Field Name	Data Type
Phone Tree?	Yes/No
Paid Dues?	Yes/No
Membership Card	Yes/No
Co-op Card	Yes/No
Title	Text
FirstName	Text
Spouse's Name	Text
LastName	Text
Address1	Text
City	Text
State	Text
Zip	Number
Area Code	Text
Phone Number	Text
E-Mail Address	Text
Child #1	Text
Child #1 Birthday	Date/Time

Field Size	4
Format	
Input Mask	
Caption	
Default Value	"OH"
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	No
Indexed	No
Unicode Compression	No
IME Mode	No Control
IME Sentence Mode	None

A value that is automatically entered in this field for new records

Limit the number of characters here.

Enter a default value here.

Modify field properties to control and streamline data input.

value for a field speeds up data entry but doesn't limit it: You can still override the value by typing in something other than the default. If you later change your mind, you can re-enter the default value by pressing CTRL-ALT-Spacebar.

To specify a default value, first display your table in Design View. Click in the field (such as State) in the upper pane; the associated field properties display in the lower pane. Click in the Default Value box and then enter the text or value that you want Access to automatically enter in the field for each new record (such as OH for Ohio). Technically, you should enter default text (but not numerical values) between quotation marks, but don't worry if you forget. Most of the time Access will figure out from the data type whether you're entering text or values. From then on, it's smooth sailing because each new record will automatically include the default value.

You can also limit the field size for any text field. This makes the database slim and trim and it will run faster, too. Additionally, it's one more way to keep others from typing an entry that's too long. Access absolutely won't let you enter text that's longer than the specified field size.

And you guessed it: You use field properties to control the field size. Display the database table in Design View and then click the field in the upper pane. In the Field Size box (shown in the lower pane), enter the number of characters that you'll allow—from 0 to 255. Oh yeah. If you change the field size *after* you've already entered data, Access won't save the change until it warns you that you might lose existing data. You give the word, however, and Access will cut off any existing entries that don't conform to the new rule.

Lay Down The Law

Another great way of controlling user input is to set a field's validation rule—your law that determines if an entry should be permitted or not. You, as the database developer, determine what value (or range of values) is permitted in a field. If someone tries to enter a different value, Access will launch an error message (which is also determined by you). Better yet, setting up a validation rule and message is easy—once you know how. Let's take a look at setting a validation rule for text fields first.

Display the table in Design View and select the field (let's say a name field) that you want to set a rule for. Click the Validation Rule text box in the Field Properties pane and enter the text that you want Access to check the entry against (such as "Geek"). In the Validation Text box for the field, enter the message you want to use between quotes (such as "Enter Geek in this field"). Save your changes and switch to table view. Try to enter something other than "Geek," and Access will flash up your custom-designed message.

Of course, limiting your users to an *exact* text sequence isn't particularly useful. (You could do that by specifying a default value.) However, you can permit a *range* of text values, such as those beginning with *L* or beyond. To do this, type **>L** in the Validation Rule box. This will permit entries that start with *L* through *Z*, but not those that begin *A* through *K*.

More commonly, you'll probably want to create validation rules for fields with numerical values. For example, if you want to limit a salary field to less than $50,000, you would type **<=50000** in the Validation Rule box. Just for fun, type, "**You make too much money!**" in the Validation Text box and try to enter a greater amount in the Salary field of your table. CPU

by **Linda Bird**

Infinite Loop

The Bars That Bind

Reaching out and touching someone has a different meaning in prison than it does in most places, but even ex-cons get nostalgic over their old Cell-Block B buddies. The Convicts Reunited Web site (www.convictsreunited.com) does an unusual kind of community service: It helps former (and apparently, current) convicts keep in touch with each other, securely and privately. A message on the Web site's home page states:

"It's no longer necessary to trawl message boards and watch countless episodes of Crimewatch and America's Dumbest Criminals, in the unlikely chance to see an entry or a wanted poster relating to someone you know."

The site, which is run by former prisoners, is based in the United Kingdom. You can use the site's database to search for former inmates, and you can post your own information so others can find you, assuming that's what you want.

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WARM UP TO PENGUINS

Linux GUIs: KDE & GNOME

IN THE BEGINNING, THERE WAS THE SHELL PROMPT—AND THAT WAS IT. THERE WERE NO FANCY GUI ICONS, NO MOUSE-DRIVEN POP-UP MENUS, AND NO DRAG AND DROP.

All that Linux offered was a simple shell command prompt. And we loved it. Then came various GUIs to simplify (or complicate) our Linux lives. Some were good, some bad, and some acceptable. Over the years, the Linux GUI market has boiled down to two players: KDE and GNOME.

Today, one or both of these will automatically install if you buy a Linux distro. You can tweak a little, but wizards do most of the complex configuration. A few years ago, you had to manually install, configure, compile, debug, and test. Getting a GUI working properly was a pain. Most people now don't even know that there's a shell prompt available.

Linux Gets GUI

Ever since Windows changed how people interact with PCs, there has been a desire to put a GUI at the front end of a popular operating system. A GUI does have some overhead, but today's fast processors and large amounts of physical RAM reduce the overhead to being barely noticeable. Most people who are migrating from Macintosh, Windows, or Unix operating systems want a GUI.

In March's issue of Computer Power User, *we presented steps for networking an Xbox via software installed on a PC running Linux for multiplayer Web gaming. This month, and in months to come, we'll delve into more Linux issues and projects. This month we focus on GUIs.*

Both GNOME (GNU Network Object Model Environment; www.gnome org) and KDE (K Desktop Environment; www.kde.com) are common Linux GUIs. Most Linux distros favor KDE as the default, but many let you choose which (or both) to install. Both GUIs have several versions in general distribution, as well as betas of new releases. The current KDE standard release is 2.2.2. GNOME is now at version 1.4.

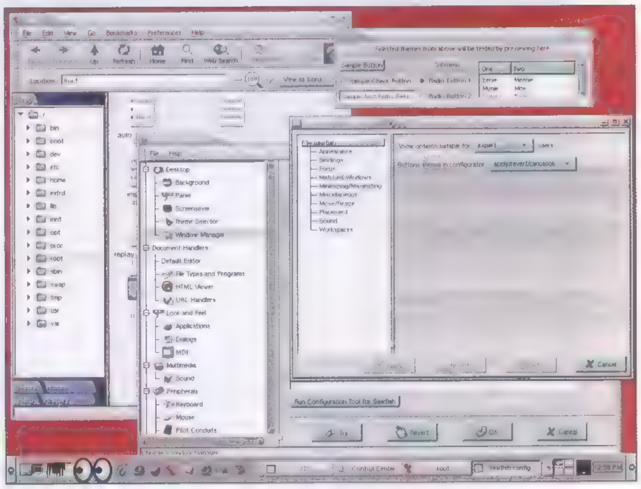
Both the GNOME and KDE GUI offer all the features of GUIs under Unix (the X/Motif Desktop) and Windows. That is intentional, as developers are trying to minimize the transition time from other platforms to Linux and hide the underlying complexity of the Linux OS. Both GUIs offer folder and directory manipulation, drag-and-drop ability, mouse-context menus, and other standard Desktop features.

You can also extensively modify both KDE and GNOME, make either one look more like Windows or X/Motif, and change most of the behavior of a system. With today's current distros, most users never bother dropping to the shell prompt, instead relying on the GUI for everything.

Make A Choice

You can run KDE or GNOME simultaneously, but there's no advantage in doing so. Because installing both GUIs chews up a lot of drive space, most users install one or the other or a full version of one and stripped-down version of the other. Most Linux distros usually focus on KDE, but a few make no distinction.

There are differences between KDE and GNOME (sometimes important), so it's worth looking at these in some detail. (To see hardware requirements for KDE and GNOME, see the sidebar titled "Hardware You'll Need For A Linux GUI.")



The GNOME Desktop interface is organized much the same as Windows or Motif, so migrating to GNOME is fairly easy. GNOME allows for extensive choices of color schemes and Desktop themes, including the default Sawfish theme here.

Let's start by comparing the installation processes. Although a wizard may automate a lot of a Linux installation, you may have to install additional software or modify default configurations. Also, as KDE and GNOME progress, you'll probably upgrade a GUI as new features are added. KDE is the more difficult to

Hardware You'll Need For A Linux GUI

Linux was designed to run on slow machines. You still can create a floppy-based Linux kernel that will boot on an 80286 PC with 16MB of RAM. This can't support a GUI, however. If you plan on using KDE or GNOME, there are hardware requirements to be aware of.

KDE and GNOME require reasonably fast hardware to function properly. As a general minimum, a Pentium 250MHz CPU or better is required. A faster processor is recommended if you'll use the GUI a lot. Don't even think about running large KDE or GNOME apps with 64MB of RAM or less. At least 128MB is a good starting point.

Graphic card support for both KDE and GNOME has advanced dramatically recently, and many state-of-the-art 2-D and 3-D cards are now supported. Supported screen resolutions are also greatly increased. Fast graphics cards will affect the performance of both KDE and GNOME, but not as much as you might think. Changing from a 200MHz card with 32MB of RAM to a 300MHz 64MB RAM card won't give you noticeable speed improvements; it's the host CPU that matters more.

If your system doesn't have a 250MHz CPU and 128MB of RAM you can still run GUIs, but you'll have to find a lightweight Desktop package instead of the KDE and GNOME default packages.

install and configure. Even with the latest releases, there's still no proper installer package that checks if prerequisites and required components are available. (The KDE development team is working on a graphical installer, but it's not in general release yet.)

The GNOME installation process is smoother because the installer can detect required packages and dependencies and alert you to issues before GNOME installs. You can still manually customize GNOME, but installers are the usual way of proceeding. From inside the Desktop's Control Panel, you can modify the system many ways.

Both KDE and GNOME require an X server be installed on your Linux machine. The GUIs run on top of X, similar to how Motif runs on top of X on a Unix machine. Usually, the X server installs automatically when you install GNOME or KDE, especially with current distros. You can manually install X (usually as XFree86) and install the KDE and GNOME software manually.

Application support isn't really an issue for most users. All the major Linux applications today run equally well under both KDE and GNOME. Some packages are a little flaky under one or the other, but most standard apps run fine under either.

Speed is a practical benchmark when choosing between KDE and GNOME on machines with slower CPUs but less important for faster processors. KDE is slightly faster in most regards, although the difference isn't dramatic. You'll notice the speed difference when loading applications, managing multiple windows, or switching between virtual Desktops, but the differences cease to really matter if you have a 400MHz CPU or faster.

When you're considering which GUI will be your main Desktop environment, keep in mind the future plans for both packages. KDE has a schedule of development plans it hasn't kept to, but the developers are open about the problems and changes and have shown excellent response to user requests for new features. GNOME's development plans are kept fairly secret, with only hints leaking out from time to time. This can be problematic when bugs or incompatibilities arise.

Blast Off

Launching either KDE or GNOME is simple. Many distros give you the option to install launch commands for either GUI in your startup files, appearing whenever you start the machine or change users. You can always manually launch either GUI as long as X is running.

When KDE starts, the default window shows the main panel, or kicker, on-screen. Usually, the kicker is at the bottom, but you can dock it anywhere. You can easily modify KDE's icons, thus various KDE Desktops may look completely different. The Control Panel lets you tailor everything from icons and colors to fonts and sound cues.

The default layout has a Start-like menu to launch apps, which lets newcomers quickly get around the Desktop. File and directory manipulation in KDE is accomplished with Konquerer, a powerful tool that supports JavaScript in its latest incarnations. KDE's default office suite is called KOffice. It works well, though many users still prefer to run StarOffice instead.

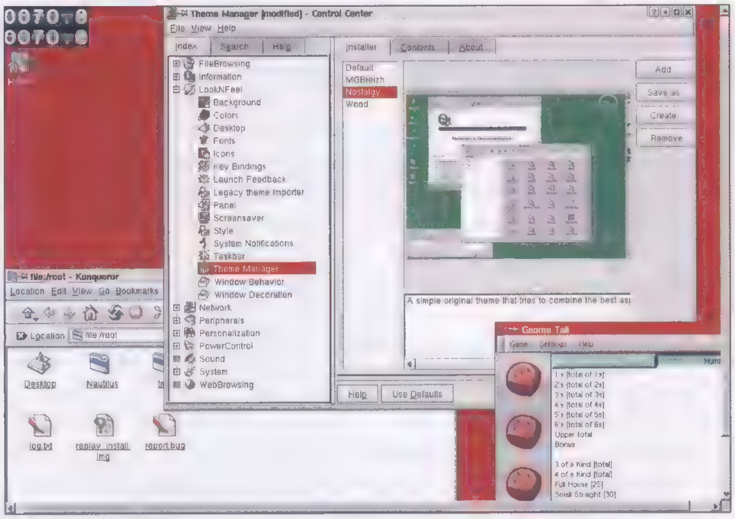
KDE and GNOME are as simple to use as Windows. Steps for practically anything you want to do under Linux are similar for KDE and GNOME, so you can easily select either GUI without thinking about how to perform an action. The graphics are slightly different, but they won't throw you off.

One KDE feature many Unix Motif users love (and one that's starting to appear for Windows through add-in packages) is virtual Desktops. This feature lets you configure as many as four different Desktops, customized right down to the icons, colors, wallpaper, and more. You can access any virtual

Future GNOME & KDE Releases

Version 2 of GNOME is now in alpha release and will soon be in beta. The alpha is unstable but does show where GNOME is heading. There's no point installing or using it unless you're a developer and want a head start on apps for the next version.

KDE 2.3 is due late this year or early next year but isn't a major change to the environment. Instead, it will offer some new features, customization options, and enhanced support for some external devices.



A simple original theme that tries to combine the best as

The KDE Desktop relies on the Konquerer file manager utility. One of the strengths of KDE is the ease with which you can change the look and feel of the Desktop, including the ability to configure virtual Desktops.

Desktop by clicking the numbered (or named) button on the kicker.

This is handy, for example, if you always want a Web browser open on Desktop 1, development tools open on Desktop 2, a game on Desktop 3, and system administration tools on Desktop 4. Each Desktop can have the same or different applications present, but using virtual Desktops lets you organize Desktops for particular uses. This ability is especially useful for developers who keep different development tools in different Desktops.

GNOME doesn't offer virtual Desktops, but it does have other handy features. One of these features is the Screen-Shooter, which lets you to take a snapshot of part or the entire screen. There's also a quick launch menu for your favorite application icons. You can't do this with KDE, although you can create icons on the Desktop that take up a lot more room.

GNOME uses the same basic window layout that KDE does, with a main panel (called the GNOME panel) that can control all aspects of the software, much like KDE's panel. Because of the use of the GIMP Toolkit as the widget library for GNOME (instead of KDE's Qt widget library), GNOME is more customizable than KDE is. GNOME also supports themes, which KDE can't quite match as easily, yet. Like KDE, GNOME has an office suite that's cleverly referred to as GNOME Office. Most GNOME users, however, prefer to use the StarOffice suite. In general, GNOME Office isn't as feature-laden as StarOffice (or KOffice).

You can customize both KDE and GNOME using the Control Panel to change icons, wallpaper, sounds, and entire Desktop themes. Beyond the superficial customization, though, you can tweak many aspects of the two GUIs behind the scenes.

Having said that, it's usually best to leave the configuration files for both KDE and GNOME alone unless you really know what you're doing. With the latest versions of both GUIs, the configuration process is streamlined enough that the only time you really need to alter the base configuration files is when you're changing the entire way the system operates, and that's very rare. It is possible, for example, to change the way processes are handled by both GUIs.

Wrapping Up

If you don't want to use either KDE or GNOME, there are other choices. None have the stability and application support of these two and are often poor alternatives unless you're using a lower-power machine. Considering the progress KDE and GNOME have made in the last two years, there really are no alternatives.

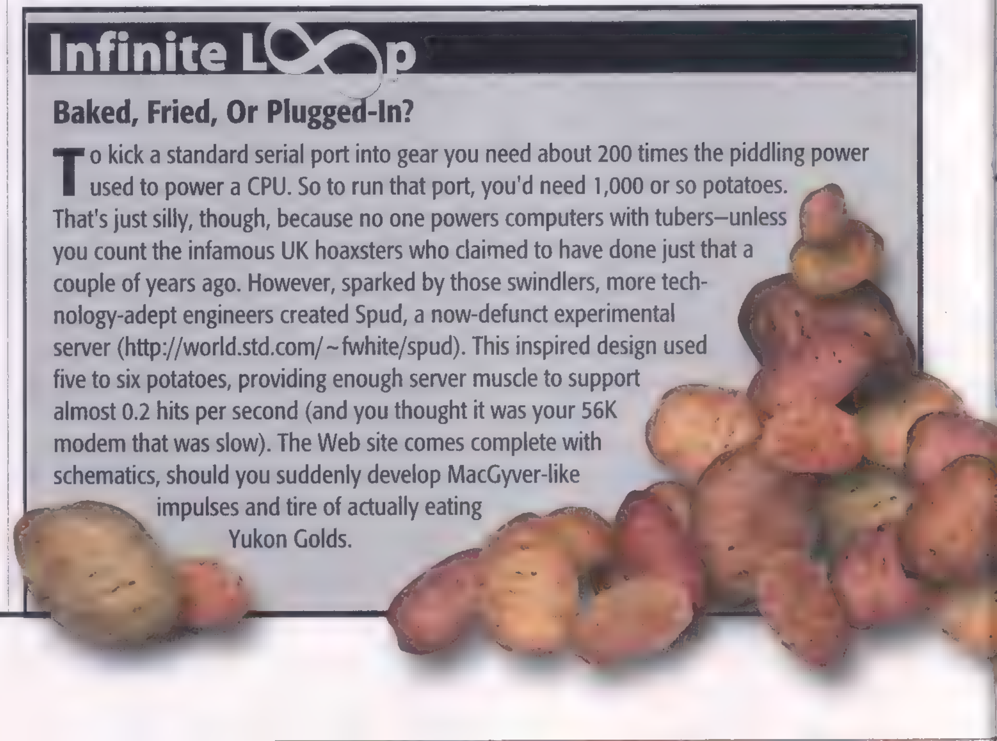
KDE and GNOME will serve you well. Installation horror stories and configuration problems that plagued early releases of both are a thing of the past. KDE 2.2 and GNOME 1.4 install easily and quickly, configure themselves properly, and offer support for most hardware configurations. Unless you have extraordinary requirements for support of a video card, you probably won't have to worry about configuration files at all. GUIs under Linux have come of age and are an excellent choice for a Linux interface. CPU

by Tim Parker

Infinite Loop

Baked, Fried, Or Plugged-In?

To kick a standard serial port into gear you need about 200 times the piddling power used to power a CPU. So to run that port, you'd need 1,000 or so potatoes. That's just silly, though, because no one powers computers with tubers—unless you count the infamous UK hoaxsters who claimed to have done just that a couple of years ago. However, sparked by those swindlers, more technology-adept engineers created Spud, a now-defunct experimental server (http://world.std.com/~fwhite/spud). This inspired design used five to six potatoes, providing enough server muscle to support almost 0.2 hits per second (and you thought it was your 56K modem that was slow). The Web site comes complete with schematics, should you suddenly develop MacGyver-like impulses and tire of actually eating Yukon Golds.



KILLER HARDWARE TIPS

Too Cool To Follow Rules

IF YOU'RE A USER WHO CAN'T LEAVE THINGS ALONE IF THERE'S A CHANCE YOU CAN MAKE THEM BETTER, EVEN IF IT MEANS BUCKING THE NORM, READ ON. WE HAVE SOME TIPS and tricks that just might help your system look cooler and make you more productive.

Case Study

An informal survey at Slashdot—the quintessential "News for Nerds" Web site— asks readers to pick their preferred PC case material (slashdot.org/pollBooth.pl?qid=736&aid=6). With more than 26,000 ballots submitted so far, the winner is titanium with 28% of the votes. Aluminum is not far behind in second (20%), wood a distant third (11%), and plastic just a blip on the radar screen.

The survey may lack certain statistical soundness, but it's clear that power users are looking for distinctive PC cases. Face it, a PC's case is purely utilitarian. It keeps dust and coffee out and noise and radio frequency interference in. A case doesn't *have* to be pretty. Nonetheless, many of us want a good-looking PC. Whether you prefer a sleek, brushed-metal case; garish candy-colored plastic; or something in mahogany, there's a company somewhere with the case for you. If not, build your own.

Typically, two extremes of users—novices and power users—care about the appearance of their computer's cases. "The novice user is interested in looks. Professionals don't really care about looks. They care about the guts of the case: number of bays, how many components it can hold, how good of a cooling device you can put in it," says Kris Shin, the manager of BuyCase (www.colorcase.com).

Plastic/steel and aluminum make up the vast majority of off-the-shelf desktop PC cases. Other materials are available for those wanting to blaze a trail off the beaten track. However, users looking for a titanium case will probably be disappointed, as this type just isn't available. The lustrous white metal is too expensive to fabricate. (If you must have titanium, check out Apple's Titanium PowerBook G4.) Here's a look at what is available:

Nothing exudes warmth like Black Ox, a 30-pound, all-steel monster case.

Plastic/steel. These cases—plastic on the outside with a metal layer shielding inside—are the most popular, economical choice. They are light, cheap, and available in a rainbow of colors, although beige remains the most common.

The steel lining can vary in thickness among models, usually from about half a millimeter to 1.5mm. A thicker layer makes for a more durable case with better insulation against sound and RFI.

Aluminum. If a plastic case is too I-bought-my-computer-at-Wal-Mart, step up to aluminum. Its primary advantage over plastic/steel is an ability to disperse three times the heat of plastic/steel—important if you have a blazing CPU or a lot of drives. "An aluminum case will help keep your computer more stable because it's a better heat dissipation device," says Shin.

Aluminum cases also weigh about half as much as plastic/steel cases the same size. Aluminum cases, however, typically cost two to three times as much, and they aren't typically as well insulated against noise, so the drone of fans and drives will be more noticeable.

"If you can't afford an aluminum case, get a basic plastic-and-steel case and add a lot of cooling products," Shin advises.

Steel. For an unusual, industrial look, consider a steel case. These are rugged, heavy (try hefting one to a LAN party), and expensive. They aren't really practical for home users, but they're sure cool.

Itox (www.itox.com) offers the Black Ox, a 30-pound, $259 all-steel case intended for light industrial environments, such as computer telephony and security-monitoring systems.

Wood. Wood is a popular alternative for folks who want to build their own cases. Wooden cases can be truly beautiful, transforming a computer into an elegant piece of furniture. In addition, it's easily customizable. Need another a drive bay? Grab some nails. You can lacquer, paint, and cut it into unusual shapes and sizes. Wood insulates sound, but also heat. If you build a wooden case, use a lot of fans.

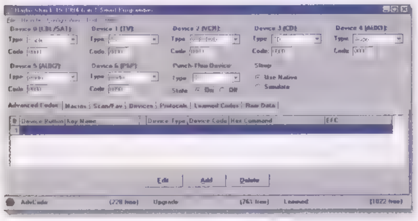
Luddite Industries (www.luddite.com) sells ready-made cases and do-it-yourself kits made of oak, mahogany, ash, and cedar. Luddite might take itself a bit too seriously ("Surrounding ourselves with natural materials eases the intrinsically unnatural relationship with technology"), but its computers are pretty.

These certainly aren't the only PC case possibilities; creative users have enclosed their computers in glass, Lucite, and countless other materials.

Remote Possibilities

Meet your PC's newest peripheral: your television remote control.

The JP1 Interface is a hardware/software hack that lets you customize certain models of remote controls in ways the manufacturer never intended. You can hook up your PC to reprogram your clicker, add support for new devices, change button functions, and build impressive macro commands.



Have too many remote controls to keep track of? The JP1 Interface hardware/software hack can help. IR is free software that gives your remote a new brain.

"For me and many other people who have built the interface, there really was not a good remote for less than $100," says Chris Nappi, who maintains the JP1 FAQ (www.hifi remote.com/jp1). "Even a good universal remote usually doesn't have all of the functions of the original remote for a piece of equipment. Sure it will have Play, Fast Forward, Rewind, and Stop for your VCR, but don't expect to have tape speed and programming. They are usually limited in how many buttons can be learned, and the learning process itself is tedious."

The JP1 interface eliminates many of these barriers, letting an industrious user control every aspect of the remote's functionality. With the interface you can decipher the learned codes and create new upgrades that map all the buttons from the original remote in a small amount of space. You can then share the upgrades with others. "Another plus is that you can have a backup of your remote's setup so you can very easily restore the memory should it become corrupted or set up another remote identically," Nappi says.

The hack works with most RadioShack and One For All brand remotes, as well as a smattering of others. Here's the trick: Those clickers have a hidden interface port (accessed through the back of the remote) and reprogrammable EEPROM memory.

The hardware component consists of a cable that connects the remote's hidden interface to a PC's serial port. Building the interface is simple. Basic soldering skills are helpful, but there are also instructions for a solderless breadboard interface. Once you've built (or bought) the interface cable, a variety of free software is available for programming your remote using Windows and Linux. An e-mail list is available to help along the way.

Your Quarters Belong To Us

If you're hooked on MAME (www.mame.net), the program that perfectly emulates classic arcade games, you know the joy of reliving your wasted youth playing Pac-Man, Galaga, and Tempest. You also know playing those games using arrow keys kind of sucks.

This may look like a classic arcade game, but there's actually a PC running MAME inside.

You can get that real arcade experience without a high-tech force-feedback joystick. Build your own arcade controls with a desktop panel complete with arcade joysticks and buttons, a trackball, or Tempest-style spinner. Or, transform your PC into an old arcade game cabinet for the full effect.

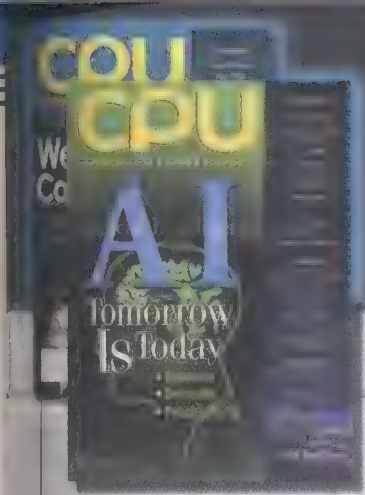
The benefit of using arcade controls instead of using a keyboard is pretty obvious, but what exactly is the benefit of using arcade controls compared to using a good commercial joystick? "Authentic arcade feel, quality, and reliability," explains Tim Eckel, who runs Arcade At Home (www.arcadeathome.com), a Web site devoted to building arcade controls for PCs. Moving from arcade controls to a commercial joystick "is like moving from a piano to a keyboard. It still makes noise and kind of sounds the same, but it feels and plays differently."

Most people who build their own controls opt for a joystick or two, Eckel says. "A minority use trackballs and a few have spinners or steering wheels."

You can get controls from Happ Controls (www.happcontrols.com) or Wico (www.wicothesource.com). You'll also need a keyboard encoder, which converts joystick movements to keyboard input the PC can use. Another type of encoder handles input from a trackball or spinner. Hagstrom Electronics (www.hagstromelectron ics.com) offers a line of popular encoders. If you have more money than time, buy a ready-made control panel, such as HotRod (www.hanaho.com/products/HotRodJoystick) or X-Arcade (www.x-arcade.com).

For building and design tips, visit Arcade At Home and the Build Your Own Arcade Controls FAQ (www.arcadecontrols.com). CPU

by Kevin Savetz



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Technically Speaking

An Interview With Doug Cavit, McAfee.com Chief Information Officer

Doug Cavit, chief information officer of McAfee.com since 1999, helped shepherd McAfee.com from startup to cyberspace celebrity. The site is regularly one of the top 50 visited Web destinations and top 10 visited technical sites. In the 1970s, Cavit was among the first to use an Apple computer and hobnob with Steve Jobs and Steve Wozniak at a computer trade show. He has worked in the oil industry and been a consultant at DARPA (Defense Advanced Research Projects Agency), the Department of Defense's central research and development organization. Cavit earned a B.S. degree in geophysics and a master's degree in geology from the University of California, Riverside.

by Gene Koprowski

CPU: What did you do as a geophysicist?

Cavit: I've always loved science and geology and seismology. I worked primarily for the oil industry. But right out of college, I worked as a consultant for the Defense Advanced Research Projects Agency. We had some key breakthroughs to guarantee the Nuclear Test Ban Treaty.

CPU: Testing for seismic reactions from secret, underground nuclear tests by the Chinese or Russians?

Cavit: A lot of the science we did as part of the Reagan administration helped validate that there was no cheating on the testing. Because of the tests, which were computer-based, the President went ahead and signed the treaty. They could verify compliance.

CPU: Was this all land-based instruments, or satellites, too?

Cavit: It was all through land-based instruments. From that experience, I moved over to the oil industry. The work was related. We did a lot of work on ray tracing—exploration. You model what the subsurface of the Earth looks like and how the geology will react with the instruments you're using. We looked at the impact of sound frequencies on the geology. It was very computer-intensive. We did very early CAT-scan stuff. The medical community picked up on it later.

CPU: Who was this for? Can you say?

Cavit: It was for Halliburton.

CPU: The company that Dick Cheney ran before he became vice president?

Cavit: Yes. But it was before he was CEO. I wish he were there when I was there. The company performed a lot better financially under him. I would have made more money. He got rid of the guys who were not the best.

CPU: How did you make the transition to McAfee.com and the consumer side of the business?

Cavit: Well, I have always been in the computer business. I never left. Computers were the only means we had to do science at my other jobs. If you look at the history, geology and geophysics actually drive the history of computing. The very first Cray machines went to the government for their purposes, and the second group went to the oil industry. All of the algorithms are tied to the oil industry. All of the gamers today owe thanks to the oil industry because they developed the algorithms that led to texturing and shading that you see on games. All of that ray tracing, lighting, and shadowing came from the oil industry and others picked up on it.

CPU: Geology drove the exploration of the West, too. The U.S. Geological Survey was developed to promote the exploration of the West—after the Louisiana Purchase.

Cavit: Right. Right. There was a geophysical company that was having trouble making transistors, so they bought a tiny Texas company to be their captive supplier. Who was that supplier? Texas Instruments. They had some key breakthroughs in making transistors more rugged. And some of the original integrated circuit technology was driven by the need for compact instrumentation for doing geophysical work. TI grew to be bigger—and became the reverse parent. Until the 1980s, Texas Instruments was still in the exploration business. There's a lot of synergy that got lost after that.

CPU: It funded the growth of an industry.

Cavit: Exactly. Venture capital did not exist initially. You had to have angel investors, really, until the late 1970s. The oil industry was a great angel for a lot of technologies that have had a great impact. Xerox PARC and SRI also were similar—big corporate ventures spinning out technologies. Since that time, it has been the venture capital industry that has sustained innovation.

CPU: What sort of projects are you working on now at McAfee.com?

Cavit: We're trying to protect people's desktops from the threat of viruses and the threat of hackers.

CPU: How so?

Cavit: What we think sets us apart is that we offer this as a Web service. There is no updating that the customer must do. It is delivered directly to the desktop. The service is evergreen and is always delivered to you. We've grown to be one of the largest subscription services on the Web, with 1.2 million subscribers. We're approaching the size of things like *Time* magazine in terms of subscribers. MSN has 7 million subscribers. But in terms of non-ISP online providers, we're standing head and shoulders above the crowd. The Wall Street Journal Online only has 600,000 to 700,000 subscribers, we believe. We're at least twice their size.

CPU: How does your service work?

Cavit: What you do is contract with us for a managed security service. You use the Internet as the medium. We manage your security for you by keeping all of your virus-prevention. We also update users with the latest technologies, constantly. Users can sign up for the service online. There are bundles of software or individual pieces of security software. We also offer an optimized experience for Windows XP; big parts of the service are delivered in XML. Rather than have a browser be a GUI, you have a smart client. That's a whole new paradigm of how computing can work.

CPU: How is that?

Cavit: Well, for the first time, courtesy of the Web, there will be a common computing language: XML. We've all talked about reusable computing components in the past. As a practical matter, in the past, nothing really worked. But as a Web service, it works. What that is leading to is a whole new set of applications for consumers and businesses. This is a new, major paradigm shift. Companies will no longer publish static content online; they will publish services on the Web that they can provide.

CPU: A lot of companies have failed when trying to sell services online. What did you do differently?

Cavit: There are a couple of reasons. One is the nature of the business we are in. We're in a business where the content—security software—has to be fresh. Security software has always been sold through a service model. What we've done is made it more convenient and easier to do. We've also had the benefit of brand equity: the McAfee name. We also made it simple. Earlier, I talked about how computing is too hard for many people. That's our philosophy. We tried to make it simple. We've got it down to three clicks for the client. It all happens in the background. You don't have to go through a major install, uninstall, CTRL-ALT-DELETE, stand on your head, scream like a chicken. Whatever it was that the computer industry put you through to get something accomplished.

CPU: What are you working on now?

Cavit: We're taking that model and wedging out. We're on the very, very ground floor of this. As time evolves, there will be a huge market for Web services. What Web services do is they get you past the threshold of having to have your software running locally. You can have a part of it running locally but derive value from software running elsewhere. You can have a wristwatch that has a wireless connectivity to and basic XML logic built into it. And that wristwatch can access business information all over the world because you can subscribe to any service. That's what gets me up in the morning.

CPU: Is the name of the company that ends in .com a liability these days with everyone so down on technology?

Cavit: Not really. The reason that we went through this—spun out from Network Associates—is that Network Associates has retained some of the rights to the name McAfee. They didn't want to give it up completely. We couldn't call ourselves McAfee. We had to call it McAfee.com. Because of the Web services model, there was too much channel conflict within Network Associates. Too much difference in the way we did business. We had to spin out just so we could pursue this business model. And I don't think we ever would have been if we had stayed with Network Associates. CPU

To read our entire interview with Doug Cavit, go to
www.smartcomputing.com/cpumag/april02/cavit

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What's Cooking . . .

Under Development

A Peek At What's Brewing In The Laboratory

Fresh from the most influential R&D labs around the world, here's a glimpse at some of the technology that scientists, lab techs, and researchers are cooking up for the future.

Roll Your Own Screen

You might think flexible computing means tucking a notebook into your briefcase. What if you could fold up a 15-inch flat-panel display and tuck it in your pocket? What if your preschooler could learn to write on touch-sensitive sheets of "e-paper" networked to a server? Or what if you could change that tired Gap logo on your sweatshirt to a new design or even an animation?

If Rolltronics (www.rolltronics.com) has its way, you will. Flexible transistor technology isn't new, but inexpensive ways of mass-producing flexible transistors are. Rolltronics has licensed Lawrence Livermore National Labs' flexible thin-film circuitry technologies and devised a way to create long rolls of thin-film semiconductor sheets measuring 12 inches wide x a quarter-mile long. In contrast, Intel's latest silicon wafers measure just 300mm in diameter. Previous flexible film methods required 700-degree Celsius production temperatures. Rolltronics can achieve the same results at 100 C.

Glenn Sanders, Rolltronics vice president of business development, information technologies, likens this roll-to-roll production breakthrough to the move from printing plates to continuous rolling printing presses in 1863, which resulted in a 60-fold output increase.

Rolltronics is pioneering the mass production of circuits onto flexible substrates. Ultimately, such PCBs will enable everything from screens you can roll up (think "Red Planet") to computer boards built into soft furniture and clothing.

Initial applications will include e-paper backplanes (a grid of transistors) for companies such as E Ink (www.eink.com) and Gyricon Media (www.gyriconmedia.com). Another early application will be the patterned electrode layer of plastic on the surface of e-paper displays, such as those mentioned earlier. The Rolltronics process combines the backplane and the ITO (a grid of electrodes) to move the pigment in the pixels up or down in the electrophoretic e-paper display to produce black or white pixels.

"Rolltronics is combining roll-to-roll processes with established semiconductor deposition methods to create an entirely new industry that will one day rival the current electronics industry in size and surpass its impact on our lives," says Sanders. "Literacy will improve through ubiquitous affordable electronic access to education and books. The digital divide will diminish as device prices drop below $100. Truly mobile wireless computers will give us the freedom to work practically anywhere. New reflective, high-resolution displays will let us work on the beach, mountainside, or backyard. Sensors in our walls and floors will make our homes more intelligent. We'll have talking cans of soup that let you know when they're out of date. Wallpaper embedded with millions of microscopic lights will provide even illumination at very low cost. And these are just a few of the applications we know of."

Proof of concept transistors were demonstrated in July 2001. Full-scale mass production of thin-film circuits is slated for early 2004. ▲

Nanoscale Skyscrapers

We spend a lot of time within the pages of *Computer Power User* discussing roadblocks in Moore's Law, the physical limits beyond which conventional technology can no longer pack transistors any more densely on a chip's surface. The problem is like trying to pack more people into a defined city center. You can't build out. You can't build in. So where do you go?

According to Matrix Semiconductor (www.matrixsemi.com), you build up. In LCD manufacturing, transistors and other components are laid down on a glass substrate. Matrix builds on this approach by starting with a silicon layer, coating it with glass, adding another layer of silicon, and so on, connecting each layer of silicon with finely etched holes filled with silicon and interwoven with tungsten wires.

Matrix will first target the flash memory market. Presently, the technology is only capable of write-once applications, which is where most memory approaches begin, with rewriteable advances eventually following. What makes the 3-D approach immediately marketable is its much lower production cost. European electronics heavyweight Thomson Multimedia recently announced it will start offering 64MB Matrix flash cards for digital cameras and music players. The card will cost roughly $10—one-quarter the price of today's rewriteable 64MB flash cards. Ultimately, Matrix hopes its chips will prove inexpensive and convenient enough to supplant film and analog tapes. 3-D stacking may yet find its way into CPUs, but many obstacles still exist, one of which is dissipating the massive amount of heat that would amass at the stack's core. ▲

by William Van Winkle

I Have This Pain In My O-Ring

You know it’s time to fix the fridge when you come home and find the kitchen floor drenched in freezer run-off. But it’s not your fault. That freezer should have *told* you it was about to go south.

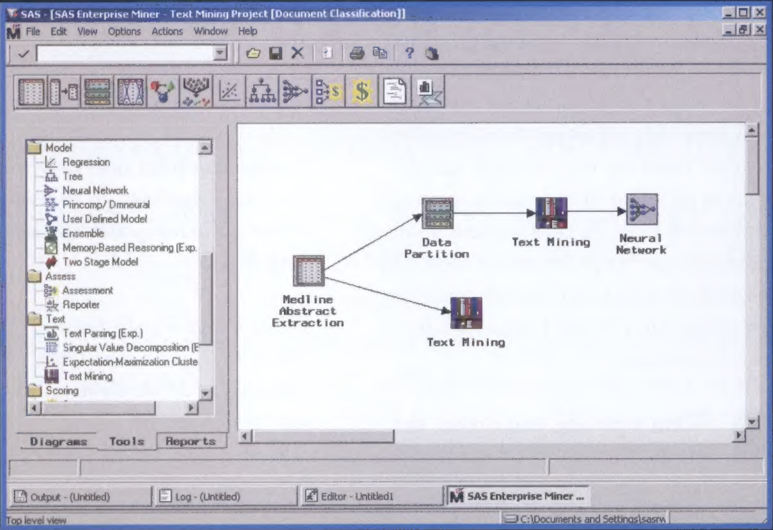
Researchers at Siemens (www.usa.siemens.com) are working to devise methods for machines to interact with humans more naturally and efficiently. Initially, the technology is being developed for floor workers to assess machines in oil, gas, and power plants in a fraction of the time diagnostics take now. Workers will place visual markers on every pertinent machine and use a camera and networked computer, perhaps even wearable components. By pointing the camera at a marker tag, the computer can communicate with the network and establish an interaction between the worker and the machine as a sort of virtual object. For example, a microbrewery worker might look at a fermenting tank and ask, “Current status?” The system might reply, “Tank number 53 is steady at 38 degrees, filled to 85% capacity with Hefeweizen.”

Ever wonder how your furnace is feeling? If interactive feedback technology being developed by Siemens reaches the market, you may only have to look at your appliance and ask it.

Although industrial applications are an obvious first market (expected by next spring), Siemens’ approach to automating objects has huge implications for everyday work and home environments. Imagine no more tour guides because visitors can guide themselves with a wearable computer through museums, galleries, or historic sites.

“In the future,” says Nassir Navab, project manager in Siemens Corporate Research Imaging and Visualization Department, “an average user will interact with the objects in his/her work environment in the most natural way. It may start with simple conversations such as ‘What is your inventory number?’ or ‘Are your parts still under warranty?’ However, it can easily extend itself to more dynamic interactions such as ‘Please let John know that you need to be replaced, but don’t tell anybody else.’

“The mobile user will be identified by the system, and based on his identity, he would be allowed to interact with the virtual object at different levels. This lets each authorized user interact with and even modify the existing information on each single object. This is far more efficient than today’s complicated written work paths, where workers report to the foreman, who reports to the technical manager, who passes it to the administration to enter it into the database.” ▲



Advanced text mining software, such as this soon to-be-released example from SAS, will let you sift through thousands of pages of text to extract patterns and information humans might never be able to piece together on their own.

What You *Really* Meant To Write

Data mining, the process of finding patterns in complex databases to extrapolate numeric facts from the information, was a huge enterprise pursuit in the latter half of the ’90s. With the help of developers, such as The SAS Institute (www.sas.com), data mining will make the next leap into text mining. With text mining, you can extract key nuggets of information from hundreds of pages of research on a topic. Businesses could quickly cull through thousands of customer feedback messages to find new facts and trends traditional data mining would miss.

Anne Milley, SAS director of analytical strategy, offers another intriguing example, “On an insurance claim, if a number of people are in an accident, and everybody starts using similar claim wording or lists the same doctor, this could be indicative of claim fraud.” SAS’ new Text Miner application has also been tested with crime testimony. Given that people tend to adopt a different style when lying, Text Miner can analyze a testimony transcript and determine higher probabilities of when a witness is trying to pull a fast one.

Milley notes text analysis is merely one strand in a broader web of tools that will help businesses, experts, and ultimately consumers derive significance from the increasingly thick morass of data in our information age.

“We have numeric, textual, spatial, and visual data available on a given subject, but all this data can be overwhelming,” says Milley. “But think about the potential of analyzing those elements collectively. The more we can harness all of these types of data together, the more effective they’ll become.”

Text Miner will be offered with the next upgrades of SAS Enterprise Miner, targeted for a summer 2002 release. Eventually, text and combined media mining may help solve seemingly impenetrable historical mysteries and reveal upcoming consumer trends. For now, we’ll be happy if it gets rid of spam. ▲

Back Door

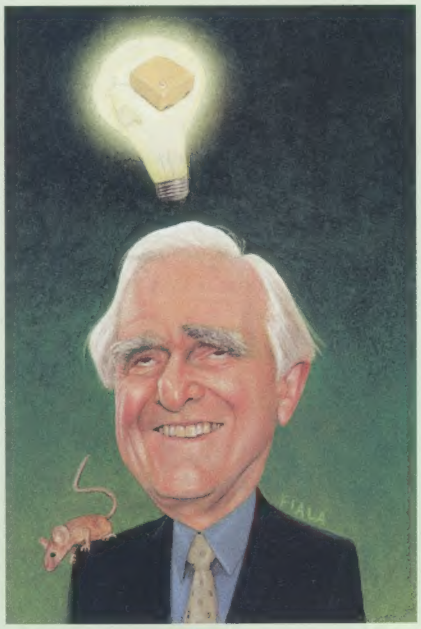
Q&A With Douglas Engelbart

Summing up Douglas Engelbart as "the inventor of the mouse" is like giving Benjamin Franklin the epitaph, "He invented bifocals." Recent recipient of the National Medal of Technology, one of this country's highest tech-related honors, Engelbart is also the principal inventor of the windows interface concept, the pointer cursor, hypertext, e-mail, and numerous other breakthrough concepts and devices. Engelbart is too humble to parade a list of his 50 years of achievements. Instead, at age 80, he would rather maintain focus on pursuing his lifelong humanitarian dream: to revolutionize the ways in which individuals and organizations cooperate to solve massive problems. He calls this process bootstrapping. (See Douglas Engelbart's Bootstrap Institute at www.bootstrap.org.)

Q What exactly is bootstrapping?

ENGELBART: Well, I guess it's a strategic concept. My professional goal is to improve our collective capability to cope with complex problems. I've sort of given that capability the basic name "collective IQ." Improving the collective IQ itself is a very complex, urgent problem. Say you take an activity and feed back all of the gains it makes into improving collective IQ rather than spreading those gains out into the world. You pump it back into the improvement process. The better you get at collective IQ, the better you're going to get at almost any other collective thing. So it's like lifting yourself up by the bootstraps.

Take three categories: A, B, and C. A is what you do every day anyway and the way you do it: your work. B is the research and development designed to improve your A. C is any activity that is trying to improve the B capability. Now, in organizations, they may say, "I want to keep the A and B stuff for myself and not give it away because that's my competitive edge." But if you look at the C stuff, it's pretty easy to show that the organization would be better off if it pooled a lot of its C investment collectively into the right community of participant organizations.



Once you get collectively better at understanding complex situations, then you can look around the world and start collectively pooling resources to get a better and better picture of the problems that exist and how people are trying to solve them. This all goes into an integrated knowledge dynamic repository so participants can see the ways in which people are successfully improving. You know what the examples are out there and how they go about their improvements. Then the organization can decide to pick this or that as an approach and invest in it. So that's where pooling resources can help. It's much more efficient than each organization going out on its own to do that kind of study and assessment.

Q What year did you invent the mouse?

ENGELBART: 1964.

Q But this was before graphical user interfaces were developed, yes? Isn't that putting the cart before the horse?

ENGELBART: Yeah. I'd been thinking by then how we were going to want to use computers and displays. I knew that you would want to be able to tell the computer what objects on the screen to do something to, so you would need a screen selection device. There were a number of candidates, including a sort of light pen you use in radar equipment.

Q What was your role in developing hypermedia?

ENGELBART: In 1945, I was in a transit base for the Navy in the Philippines waiting to get assigned, and I found a Red Cross library in a hut on stilts. I found a *Life* magazine that had a story about Vannevar Bush. After reading it, I realized that one of the basic things you'd want to be able to do with a computer is talk about any object in any file, and to do this you need links. I can't remember honestly whether I took that from the Bush article, but after I'd done a lot of work and further research, somehow I was reminded of those concepts. I have no trouble at all sort of crediting him for the first idea about hypermedia, but I guess I was the first one to get it working in a computer and build a whole system around it.

For our complete interview with Douglas Engelbart, go to www.smartcomputing.com/cpumag/apr02/engelbart.

William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside of Portland, Ore.

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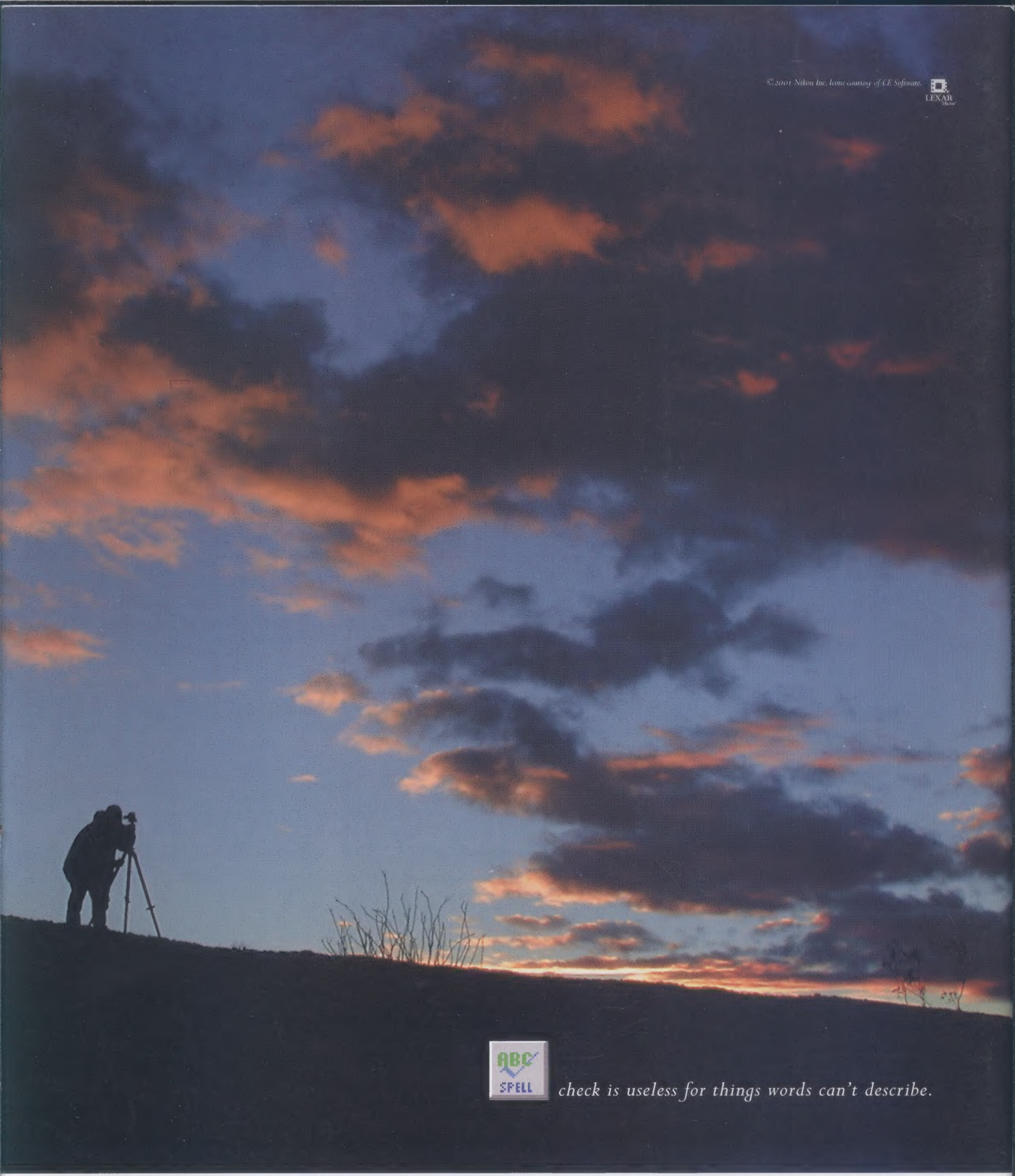

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